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THE

Sanitary Record,

JANUARY 7, 1898.

PAST AND FUTURE.

Once more the whirligig of time has brought round the commencement of a new volume of the Sanitary Record, and on the threshold of another year we are again constrained to dilate upon the past, and discuss the future. Both, we are glad to say, are pleasant tasks. Behind us is a record year in every sense of the word, while ahead the prospect is bright with the promise of even better and greater things.

Two occurrences may fitly claim to have preceded in our retrospect, viz., the publication of the Dibdin series of articles on "The Purification of Sewage and Water," and the Imperial Victorian Exhibition at the Crystal Palace. Though totally dissimilar, both have had no small share in strengthening our position. The "Food and Health" supplements, too, have been notable factors in the past year's success.

In a general way we owe much to the individual efforts of our readers of all classes, and we take the present opportunity of thanking them one and all for their cheering and disinterested help. We think it will be generally admitted that we have kept our promise to study and promote the interests of all classes interested in public health matters without undue distinction. At all events, such has been our endeavour, and such is the attitude we mean to maintain in the future.

Our programme for the year that is ahead is too comprehensive to enter into fully, but our readers may rest assured that it will not be found wanting in those important details which constitute the features of an up-to-date journal. Many of the best writers on public health matters have been commissioned to give the results of their life studies in our columns, and Mr. Dibdin will continue to communicate to us the latest phases of his work in the form of special articles, the first of which appears in our present issue. Mr. W. H. Maxwell will carry his "Notes on Practical Sanitary Science" through some highly interesting chapters to a successful conclusion; our "Notes and Queries" will, as heretofore, assist our readers in solving the problems which from time to time arise upon various topics, and as it is our desire to extend this feature, we solicit the fullest possible use of its benefits. Mr. F. Latham, it will be noted, commences in the present issue, a series of practical papers on "The Sanitation of Domestic Buildings;" and we have made arrangements with Mr. C. G. Moor, M.A., F.I.C., of the State Laboratory of Medicine, King's College, to contribute early in the year a series of articles on "Hygiene." Medical Officers of Health all over the country will, as previously, communicate notes and comments of interest, and Sanitary Inspectors will find greater prominence than ever given to the doings of their organisations in whatever part of the country they may exist. Important developments will be made in other features, but what these are, must, for obvious reasons, be kept in abeyance. Our readers may take it for granted that we are keenly alive to their needs, and that what so many of them have been pleased to comment upon eulogistically is merely an earnest of what we intend to do during the year that is before us.

Notes.

The year that has just closed has been one of exceptional prosperity for the whole of the United Kingdom, the volume of trade exceeding what has been recorded for many years past. In the working classes especially such a season of prosperity spells increased comfort in the home, and probably greater attention to hygienic requirements. Indications of this may be seen in various trade returns. In the building trade, for example, which

has enjoyed a period of phenomenal activity during the last twelve months, it is very gratifying to observe that the principal increase has been in tenements of two-roomed houses, which is a sign that superior house accommodation is in growing demand among the masses of the population. The danger at such a time of building enterprise is that builders, in their haste to take advantage of the wave of prosperity and to get their contracts completed with profit to themselves, may put out an inferior class of work; and the recognition of this inevitable temptation must therefore call for increased vigilance from Sanitary Inspectors in the supervision of all work brought under their notice.

Among the recipients of the New Year Honours gazetted last week, we find the names of three medical men of considerable eminence—Dr. Batty Tuke, President of the Royal College of Physicians, Edinburgh; Dr. Struthers, President of the Royal College of Surgeons, Edinburgh; and Dr. Gairdner, Professor of Medicine in the University of Glasgow. The name of Dr. Gairdner is of especial interest to all who are interested in Health. In 1862, the year in which he received the appointment to his present chair, he published a volume entitled, "Public Health in relation to Air and Water," the record of the first course of lectures on sanitation ever delivered in Scotland. The introduction of this volume to the notice of Mr. Ure, then Convener of the Health Committee of the city of Glasgow, and afterwards Lord Provost of the city, led to his seeking the co-operation of Professor Gairdner in carrying out a scheme which he had framed for the establishment of what has since become the Health Department of the city, with the result that Professor Gairdner was appointed the first Medical Officer of Health of Glasgow, and held that post for nine years.

In the discharge of his duties in that capacity, Professor Gairdner was called upon to deal with several severe epidemics. In connection with the threatened visitation of cholera in 1866, as well as with various outbreaks of fever in other years, he made a systematic investigation of the conditions of the tenement houses and slums of the more densely-populated parts of Glasgow. He also visited Paris, with the view of examining the improvements which had been carried out by the Emperor in the French capital; and it was in part owing to the experience gained during that visit, in addition to his previous experience at home, that the great revolution in the sanitation of Glasgow effected by the first Improvement Act was brought about. Professor Gairdner may, therefore, in a sense be congratulated as having been one of the fathers of sanitation in Scotland, and his new-found dignity of K.C.B. is a well-deserved recognition of the services he has rendered to humanity during a long and useful career.

One other New Year Honour falls to be noted here. Sir Thomas Lipton's knighthood may be taken to be a tribute not merely to an exceptionally successful business career, but in part no doubt to the princely use he has made of his wealth, notably in his contribution of £25,000 to the Princess of Wales' Jubilee Dinner Fund, and in relieving the congested districts of Ireland by his large purchases of the produce of the impoverished tenantry. At the present time considerable interest attaches to the scheme which Sir Thomas is understood to be maturing, for the establishment of restaurants all over London, for the benefit of the poorer classes. He proposes to expend about a sum of £100,000 on these restaurants, where the poor may be able to get substantial and wholesome meals at a very low figure; for instance, he calculates that a good dinner should be supplied for about 4d., or 4½d.—and where they may also be able to enjoy a little reading, and other profitable recreations. It is intended that these institutions shall be scattered in all parts of London where there is a large industrial population; and it is of the essence of the scheme that they should be made self-supporting. The plan has already received the support of many influential persons in high position, and it is believed that it will shortly assume practical shape.

The conception of these institutions is somewhat similar to that of the Rowton Houses Company, of which Lord Rowton is the chairman and moving spirit, and which aims at providing poor men's hotels or clubs, where working men may not only dine and pass an evening, but where they may sleep and enjoy a good bath at any hour. The Rowton Company has been pretty well before the public of late, first on account of its successful fight with the London County Council, who claimed that their consent was necessary under the Building Act of 1894, to the erection of these homes, and next because of the opening the other day of the newest and largest of the Rowton Houses, with accommodation for 800 men. They are altogether wonderful establishments, these Houses, and marvellously cheap. A man can occupy an excellent room for 6d. a night, and it is calculated that he can live there in considerable comfort for 10s. a week.

But to the sanitarian, one of their chief merits is the facilities they afford to a poor man for getting a good wash. There are many men who do not belong in strictness to the working classes, who have seen happier circumstances, but who, having come down in the world, are compelled to forego many of the comforts which to them are almost as the necessaries of life. To such men the inability to procure hot water and a bath when they wish, to be compelled to live in dirt, would make all the difference between comfort and misery, and to them the Rowton Houses offer an inexpressible boon. They can there enjoy, at a moderate cost, and in pleasant surroundings, many of the comforts which are usually supposed to be only within the reach of the well-to-do classes, and they can make sure, at all events, of living in cleanliness and health. Such institutions as the Rowton Houses have already erected and are still erecting in various parts of London, and as Sir Thomas Lipton contemplates establishing, are a marvellous feature of the age, and one which should do much to elevate the poorer classes, and raise a standard of comfort and cleanliness which cannot fail to have far-reaching results. And perhaps the most remarkable thing about them is that they can be conducted as successful commercial ventures, and not merely as philanthropic and charitable enterprises.

INSTRUCTION by means of popular lectures is comparatively a modern idea; and although it is not exactly an ideal educational instrument, it often stimulates the hearers, and induces them to seek for fuller and more adequate information elsewhere. Among the many topics chosen by public lecturers, we are glad to see that there is a growing tendency to treat of what have come to be known as "social subjects," and that so many of these bear on questions connected with the public health. The report of one of these lectures is before us, the subject being "The Houses of the Poor," and it will readily be admitted that there are few questions that have a more important bearing on the health of the community than how to provide suitable and adequate dwelling accommodation for working people. The history of nearly every epidemic has shown that the disease has broken out and raged with greatest fury in those quarters of a town or city in which the poorest class have dwelt, for such dwellings are most frequently insanitary, both in their construction and in their surroundings. The poor people have often, however, no choice; and the burden must lie on the wealthier members of the community to see that their less fortunate neighbours are decently and healthily housed.

THE reading of a lecture on "Dairy Sanitation" is apt to leave on the mind a feeling of vague wonder how it is that any of us are alive. For we all use milk in one form or another; and it seems so difficult to keep cow-houses and byres free from contamination, that it might well be matter for surprise that tuberculosis and diphtheria and scarlet fever are not circulated with every round of the milk carts. And yet the efforts of Medical Officers of Health and of Sanitary Inspectors have been so successful that there are many cow-houses which are quite above suspicion. This means, of course, not only careful inspection, but a very large and constant amount of conscientious supervision on the part of the dairy keepers. It implies the keeping of the byre at the right temperature, together with an adequate degree of ventilation—two conditions not always easy to combine; the admission of an abundance of sunlight, which is specially inimical to the welfare of bacteria; the due separation of the milk-house from the byre, from dwelling-houses, and from dungsteads; the most scrupulous personal cleanliness in the dairy operations, and the greater care in the cleansing of the milk-vessels. The task is not a simple or a light one, but experience has shown that it can be accomplished, while yet the dairy business is made a sufficiently profitable one.

LORD SALISBURY'S recent pronouncement on the subject of London municipal government has been followed up by action that may result in an important readjustment of several of the existing City administrations. The Moderate party in the County Council are moving in the matter, and are showing that they are very much in earnest in desiring a change. Their aim is to persuade the Prime Minister to confer upon a number of the more important metropolitan parishes, whose affairs are at present administered merely by local Vestries, the dignity of incorporation. At a meeting held recently of the representatives of these parishes—including Westminster, St. Marleybone, St. Pancras, Kensington, Lambeth, Chelsea, Hampstead, Paddington, St. James's, Deptford, and Hammersmith—a resolution was adopted to present a memorial to the Prime Minister and the Duke of Devonshire which may have momentous consequences.

THE memorial sets forth that the parishes in question represent in the aggregate a population of 1,379,876, and a rateable value of £12,296,751. Men who come before the Government with such a backing may reasonably think that they have a fair claim to get a hearing; and they may justifiably believe that in such a position they have a right to urge, as the memorial does urge, "the introduction of a Bill to create metropolitan municipalities of dignity and importance, with powers to undertake and perform municipal duties; subject, of course, to the peculiar circumstances of the metropolis, which must reserve to the existing central Authorities the management and control of such matters as affect the whole of London as a county." The thought embodied in this memorial seems to correspond, fairly enough, with the ideal of a municipality sketched the other day by Mr. Chamberlain, which should consist of men known to the electors, and which should be sufficiently in touch with them and with their requirements and desires, to be able to meet these in the most effective way possible. The difficulty with the Government, of course, is to draw the line with sufficient accuracy between over-centralisation and undue delegation of powers; but in a huge community like ours the danger lies rather in the former direction than in the latter. The Prime Minister has agreed to receive a deputation on January 20th.

SIR JOHN HUTTON had a congenial task on Saturday last when delivering his presidential address to the Sanitary Inspectors' Association at Carpenters' Hall. As a past chairman of the most important municipal body in the world, he could speak with authority on the progress made in London's Health Department in recent years. In one sense the figures given by him are simply appalling If in less than a century London has quadrupled itself, we may well shrink from trying to estimate what the progress is to be in future years. Again, the effect of modern methods upon the longevity of the race was well illustrated by the comparison of the death-rate two centuries and a-half ago and that prevailing in the metropolis to-day. In 1660 the inhabitants died at the rate of 80 per 1000, but in 1896, with a population verging on four and a-half millions, only 18·9 per 1000 deaths were recorded. We thoroughly endorse Sir John's remarks on the necessity of maintaining a high status among the ranks of Sanitary Inspectors. But to do this requires something more than the appointment of an Examination Board, excellent as that may be in itself. If men are to be expected to put in good and conscientious work in carrying out the duties of their office, a substantial advance must be made in the remuneration of the Sanitary Inspector. To expect a high standard among those who do not value their services at more than £50 or £60 a year, is looking for the impossible; and the sooner our Local Authorities realise this the better. With a "living" salary and more graceful acknowledgment of his services, the status of the Inspector would soon attain a higher level.

Last Saturday the Maidstone Town Council received a report from Dr. Washbourne and Mr. Adams, who have carried out a thorough analysis of some water obtained from the Tutsham spring, the pollution of which is generally supposed to be the cause of the typhoid epidemic. These gentlemen state that it is a debateable question whether it is possible in the present state of our knowledge to demonstrate the presence of the typhoid bacillus in water contaminated with typhoid material. Most of the cases in which typhoid bacilli are stated to have been found in drinking water occurred at a time when the tests available for distinguishing the typhoid bacillus from bacteria were insufficient. The difficulty of recognising the typhoid bacillus is so great, the analysts state, that no importance can be attached to the failure of discovering the typhoid bacillus in water suspected of being the cause of an epidemic. The contents of the analysis occasioned considerable surprise in Maidstone. The analysts, however, explain that in the absence of the typhoid bacillus in the samples of water taken from the Tutsham spring (supposed source of epidemic) may be accounted for by the fact that the samples were not taken earlier. Although they discovered no typhoid bacilli, they found conclusive evidence of contamination with animal excreta.

The first move taken by the Mayor of Greater New York on his assumption of office is not calculated to inspire confidence in the minds of the advocates of good and pure government. To remove, at one stroke, the heads of fifty departments, and replace men with inexperienced, and therefore inefficient men, does not bode well for the administrative work of the municipality. It is "popular" government carried to the very worst extreme. The dominating idea of these "bosses" will not be the well-being of the people, not the abolition of public nuisances, nor the sweeping away of insanitary and dilapidated property; but keeping themselves in the good books of Tammany Hall. And what is true of the "bosses" is equally applicable to every grade of the service. Each man will be simply working for his own ends. He will know that the same "popular" vote that has given him a position, may take it from him at the end of four years, and it is only human nature that he should do his best to make the most of his opportunity. The whole system of "party government" as carried out in America is a burning disgrace to a great nation. It opens every door possible for bribery and corruption of the vilest and most discreditable type. The mystery is why the people should permit themselves to be the tools of these place-seekers and partymongers. To think that the health of a great city should be placed in the keeping of men utterly devoid of any other qualification than that of being "Democrat" or "Republican" passes the comprehension of all right-thinking men and women.

The Health of London is satisfactory, if we accept the interesting report of Dr. Shirley Murphy, the Medical Officer of the London County Council. The population of the Administrative County of London is estimated at 4,443,311; and of this number Islington contributes the lion's share with a population of 337,639; Lambeth, Camberwell, and St. Pancras following at a respectable distance. In 1896 it would appear that London had a lower death-rate—18·1 per 1000—than that of Manchester, Liverpool, Birmingham, Leeds, Sheffield, Hull, and Salford. And the healthiest district in the metropolis is Islington, to the north of the Thames, with a death-rate of 15·6 per 1000. This is eminently satisfactory, as Islington is also the most populous in "the great village." Details are given of outbreaks of infectious diseases on milk-shop premises, which were summarily dealt with. After all, 256 cases of disease out of 21,284 inspections show that the Dairy and Milkshop Orders are fairly well administered in the county of London.

"Watering milk" is the modern equivalent of "the cow with the iron tail," which greatly affects the quality of the fluid supplied to the patients in our London hospitals. It is really too bad to deprive needy patients of wholesome nourishment by dilution with water. Some wholesale London milkmen profess to "sell milk as the cow gives it," but the *Lancet* finds that to be erroneous. Eleven samples of milk supplied to hospitals have just been examined; seven were of good average quality, two were of indifferent quality, and two were decidedly poor and in all probability diluted. Our contemporary is of opinion that our great charitable institutions should be protected against this watering process, and for this purpose the Government should strengthen the hands of the Inspectors under the Sale of Foods Act. The best plan would be to take a sample from every can as it arrives at the hospitals from the stations; and then make an example of the man who dares to rob the sick poor of "milk as the cow *gives it*."

Explosives are occasionally employed to clear away obstructions in the course of drainage and sewerage works; and the late Mr. Alfred Nobel's dynamite is frequently utilised as the agent. Out of the fortune the inventor made he has left a portion for "the benefit of humanity." After various bequests, the capital of the whole of the remaining realisable property is to form a fund the interest from which is "to be annually divided in five prizes to those who during the previous year have done most for the benefit of humanity." Sanitarians may be interested in the departments of natural physiology, philosophy, chemistry, or medicine, and the prize-winners will be those who have made the most important discovery or inventions, or improvements in either of these branches. The fortune left by Mr. Nobel is just under half a million.

Sewage outfall works are in course of construction in Cheshire for the Corporation of Stockport, and in the process of excavation a unique bog oak was discovered, weighing about 40 tons. This grand fossilised trunk, with two branches, is an exceptionally fine specimen, exceeding in dimensions any oak now growing in this country; and its quality, beauty of colour and grain make it unique, as there is sufficient material to furnish a town hall or other public building. The Corporation proposed to blow it up with dynamite, but the townsfolk objected. There is no doubt that a number of enthusiastic antiquarians will defray the expense of excavation, in order that this mighty oak of the centuries may be preserved as a historic specimen of the treasures of the earth.

AMMONIACAL NITROGEN IN SEWAGE AND EFFLUENTS.

By W. J. Dibdin, F.I.C., F.C.S., &c.

The question having been raised as to the value of certain bacterial methods of sewage treatment as judged by the analytical results which have been published from time to time, it will be of value to discuss the question in full in order that the point may be set at rest, as unless this is thoroughly done it will continue to be objected by captious critics that the system is uncertain, and therefore unreliable, despite the fact that a satisfactory degree of efficiency is attained.

I will first set out the results of analyses by various chemists of the sewage and tank effluent obtained by the process known as the septic tank system. The following table will indicate these very clearly :—

Date—1896.	Chemist.	Free ammonia. Sewage.	Tank effluent.	Difference. p c.
Oct. 26th and 27th	Perkins	4·5	7·5	+ 66
Nov. 3rd and 4th	Rideal	3·6	4·9	+ 33
Nov. 3rd to 15th	Dupré	3·6	5·6	+ 55
Nov. 13th and 14th	Rideal	8·5	11·2	+ 32
1897.				
April 5th to 9th	Dibdin and Thudichum	4·3	4·6	+ 7
May 23rd to June 8th	Moore	4·4	2·8	− 36
June 17th to 22nd	Dibdin and Thudichum	3·5	2·2	− 40

Unfortunately the temperature of the sewage does not appear to have been observed in all cases, this factor having evidently been considered as unimportant, and therefore overlooked; but it may safely be assumed that the temperature of the sewage would follow the season, and I have, therefore, set out the analyses in order of date, commencing with the period when the process was first started.

It is a fact well known to all bacteriologists that microbic action is all but dormant when the temperature to which the organisms are exposed approaches the freezing point, but that it gradually increases as the temperature rises, and thus it is that when it is desired to promote bacterial development the inoculated materials are placed in a chamber which is kept at the constant temperature of 21·5 deg. Cent., or 71 deg. Fah. nearly, with the result that in a day or two the growth of the colonies formed from the single germs will often be so great as to liquefy the whole of the cultivating medium, whereas at a temperature below 40 deg. Fah. they might have been kept for weeks before such a result would have been attained.

In a septic tank, exposed to all the variations of climate and receiving sewage at corresponding variations of temperature, a similar condition of things might be expected, and such is indeed the case. During the colder weather the organisms, or certain of them, can perform a certain amount of work in peptonising the solid organic matters, but not always to the full extent, while the nitrifying, or oxidising organisms, are in a sluggish condition and incapable of effecting the further change of the ammoniacal nitrogen or "free ammonia," as it is generally called, to a degree comparable with that prevailing at a higher temperature. The result of this action is, therefore, that in the winter and early spring an increase in the quantity of ammonia in solution is observed in the effluent issuing from the tank, whilst during the warm summer months, when the temperature of the sewage is necessarily higher, the ammonia formed by the bacterial action on the nitrogenous ingredients of the sewage is either oxidised into oxides of nitrogen or set free in a gaseous form, and thus a less quantity of ammonia is found in the effluent than in the sewage, and, seemingly, ground is afforded for the objection that contradictory results are obtained by different observers, when those observers make their determinations of the quantity of free ammonia at different periods of the year. This erroneous argument has arisen from the method in which some of the results have been published. Instead of the whole of the details being set out in full, averages of all the observations made at different periods have been given.

Having regard to the final character of the effluent obtained, the point is in reality unimportant, were it not for the fact that on insufficient data, and want of knowledge of the conditions of the problem, criticism is brought into play on a side issue to weaken the definite statements of competent and impartial experimentalists, who, working independently and under different conditions, have naturally obtained results which at first sight appeared to be contradictory to the results of work both by themselves and others.

Over and over again the same sequence of events has occurred, not only in regard to sewage treatment, but with respect to almost every experimental stage through which we have to pass. One of the first things which a student has to learn in connection with scientific work is that when he obtains a certain and definite result, and has proved by all reasonable and proper checks that there was no mistake on his part, he must have the moral courage to adhere to it, never minding the "impossible's," and "can't be's" of those who have not troubled to repeat his experiments, or to understand the conditions relating to it. For a time he may be under a cloud of suspicion as to his capacity; he may receive many a cold shoulder; but he must be deaf, dumb, and blind to all save the definite experimental proof of his error or confirmation of his result.

In the case of bacterial action on crude sewage taking place in a coarse bed, aërated after each discharge of effluent, as in the Sutton system, the presence of atmospheric oxygen was sufficient to ensure such an action that a decrease of ammonia took place, except on two occasions, viz., February 8th and May 17th. On the latter date the action of the bed had been seriously interfered with by overwork, to which it had been purposely subjected for experimental purposes. In the case of the final filtrates from the fine bed, whether at Exeter or at Sutton, we have a very large percentage reduction of free ammonia following the aëration of the beds, together with a considerable development of nitrates, although insufficient to account for the total nitrogen in the original sewage, a large proportion of which undoubtedly escaped in a gaseous form. That this must be so will be evident from the consideration of the fact that while the above remarks apply only to the matters dissolved in the water, there yet remains for discussion the nitrogen in combination with the solid suspended particles. If these are taken at 60 grains per gallon (*vide* Sutton results), of which 30 grains may be reckoned as organic, and the nitrogen on this quantity reckoned at 5 per cent.

(which factor I deduce from numerous determinations on average sewage mud), we have 1·5 grains of organic nitrogen per gallon in the form of solids, which are unaccounted for in the effluent, which, as already shown, contains less total nitrogen in all forms than was present in solution in the original sewage. It is, therefore, evident that as neither this solid nitrogen, as it may be called, nor the total quantity of dissolved nitrogen is accounted for, there must be a loss, and this loss can only, in the light of our present knowledge, have taken place by its conversion into a gaseous form, in which condition it escapes into the atmosphere. The question is one which requires very careful research for its elucidation, and will doubtless shortly receive the attention of those who are fortunate in having the time at their disposal to devote to it, as a complete knowledge of the whole series of changes which take place must result in placing the process of bacterial treatment upon still more definite and firm lines. Fortunately, however, the practical outcome of the position is such, that while we wait for further information, we need not hold our hands in applying the substantial knowledge we now have to the treatment of foul water, and thus to secure for the public benefit the fruits of the work already done.

THE SANITATION OF DOMESTIC BUILDINGS.

By Frank Latham, C.E., M. San. Inst., &c., Assistant Surveyor, Borough of Margate.

CHAPTER I.

INTRODUCTION.

The subject of house drainage is one which demands a greater amount of serious attention than is ordinarily paid to it, this neglect being in many cases the product of ignorance regarding the methods of modern sanitation, and in some instances the result of less excusable influences. That the diseases caused by sewer air and communicated through defective house drains are constantly with us cannot be denied. This condition of things could be ameliorated, if not entirely prevented, and the death-rate reduced, if more earnest thought were given to it; and it is the object of these articles to throw some light upon this important truth, with the hope that it may be of some practical help to those whose health and happiness is bound up in this vital question. Some people are apt to evade sanitary precautions, or to attach but little importance to them, whilst others are actuated by motives of false economy, and in cases such as these, it is only by a fortunate chance that no bad effect issues. When persons are, however, made aware of their negligence it is often too late to prevent the disease and suffering which ensue. The writer has such an instance of neglect and its result before him, where a party occupied a house for some time. Towards the end of his term, he and his family suffered from illness eventuating in death, which was attributed to the condition of the house drains. An Inspector was sent to examine and report upon the state of these; but was refused admittance, and only some slight exterior reparation was done in connection therewith. His successor, being more enlightened in sanitary matters, before entering upon residence in this house caused a thorough examination of its sanitary condition to be made, when it was found that the drain, which passed beneath the floor, was without proper joints, the pipes being occasionally some inches apart, several barrow loads of black, rank sewage having accumulated beneath the floor.

The foregoing is too often typical of the worst form of ignorance and neglect of sanitation; but there are many other cases of a less glaring character which have been the cause of much disease, misery, and loss, emphasising the fact that the necessity for good sanitation is shared in and demanded by the whole community, the neglect of it, although it may be only an individual instance, endangering a wide area — either directly or indirectly—by its alarming and deadly results. A water supply contaminated through leaky drains, or imperfect condition of sanitary apparatus, may be distributed throughout a district with fatal effects, whilst the most dreaded and infectious diseases may be traced to bad drains, the germs of disease being contained in and conveyed by the escaping drain air. In many old houses, where the drainage has not been modernised, it is frequently the rule to find their condition unsanitary. Cases have come under the author's notice where the cesspool has, or cesspools have, been found beneath the kitchen floor, these having no proper ventilation. The yard of a house will perhaps be undermined with cesspools, the owners following the custom of emptying the contents of the old into a newly-dug one, these overflowing the one into the other, old wells being not infrequently utilised for such purposes. The cesspool and well are sometimes discovered side by side, the steining (when it exists) of the latter bearing distinct greasy marks of sewage percolation. The closets and other domestic arrangements are often placed under the staircase and other unsuitable corners, whence they ventilate into the house.

The position of storage cisterns in many houses permits no proper access for cleansing and inspection purposes, the cisterns themselves being without suitable covering, and not effectually cut off from communication with the drains. In some cases, where it is readily accessible from the bedrooms, servants may, if the cistern be not covered and locked, dip and wash filthy articles in the water. These are, then, some of the defects which frequently exist in old houses, and it is even far from rare in houses of recent date for such arrangements to be found, some being still perpetrated when opportunity offers.

Amongst the defects commonly met with of an undoubtedly injurious and dangerous character, may be enumerated leaky drains; drains with insufficient or varying falls, and with no provision for inspection and access for cleansing; defective and insufficient traps and gullies; the use of the filthy D trap, flimsy soil pipes, perhaps inside the house, and unventilated except through the joints; rain-water down pipes used as ventilators, perhaps unjointed and situated near windows, or terminating under eave of roof, and near storage water cisterns; waste pipes from sinks, with only a useless bell trap; openings of drains in floors for washing down purposes acting as ventilators; unsanitary closets; ventilation pipes taken into chimney flues, and other arrangements permitting the escape of poisonous effluvia.

Dr. Thorne Thorne, C.B., shows in his exhaustive report dealing with typhoid and diphtheria, that the typhoid fever death-rate has gone hand in hand with improvements in sanitation, it being about 0·38 per 1000 in the seventies, and has gradually fallen to 0·17, or less than half. Typical cases of fever outbreaks from imperfect sanitation are given by Dr. Chaumont, and Dr. Garrett, of Cheltenham, and others. The author has had several such cases of typhoid and diphtheria come under his notice, and upon investigation, nearly every case could be traced directly or indirectly to bad and defective sanitary arrangements; and it has invariably happened that upon prompt attention, and defects being remedied, the spread of disease has been checked, delay in such cases ensuring its further spread. One instance strongly suggests itself. A case of typhoid took place in a house, and a child, living in another part of the house, soon after contracted the disease. This the author investigated, discovering that the house was drained into a cesspool nearly filled up; the ventilation pipe—flimsy and defective—in connection with the cesspool being fixed against the house wall close to the window reveal of the room where the second case took place. The house was practically a new one, but in fixing the ventilation pipe in question one of the cast iron lugs projected in front of the window of this room, and this lug had been removed by a blow, taking with it a piece of the back of the flimsy pipe, making a large open fracture, partly obscured from sight, and on a level with the window of the room. It was by the smoke test that the fault was discovered, the smoke escaping in such quantities from this fracture as to blacken the brickwork reveal and window sash, and proving that the gas and impure air passing off from the cesspool in this manner escaped and found its way through the window into the interior.

Another case of a similar character was where two children died from diphtheria, which was traced to a communication between a filthy privy pit and the underneath of the floor of a house by a network of rat runs. The work of house drainage undertaken and carried out by many builders is too often considered by them as a secondary matter requiring little attention, and the fact that some of the principal parts when completed are hidden under ground and floors, or behind casings, gives opportunity for concealing much bad work. In order that houses should be healthy dwellings the drainage must be perfect, and where this work has been satisfactorily executed, it remains the duty of the occupiers to exercise cleanliness. To ensure that all drains should be above suspicion, good workmanship on the very best principles must be insisted upon, whilst those engaged on the work should be under the direction and control of competent and reliable authority.

If a town is sewered by a defective system, it is no reason or excuse that house drains connected therewith should not be of the best, for house drains in connection with bad sewers or cesspools have the greater need of perfection to keep back offensive effluvia and germs of disease—present in cesspools and defective sewers—from penetrating the dwellings, contaminating the air, and attacking the inmates. It is a mistake to think that because once house drains are made perfect they will remain so for an indefinite number of years. They should be periodically tested with a view of ascertaining whether any faults in their action or construction exist, such as fracture caused by frost, settlement, or undue pressure, or jar, trap bottom knocked through, or water-closet cistern out of order, and so giving insufficient flush to cleanse the drains. All of these accidents are possible, and although the fault may be small, its result may be serious unless rectified. Occupiers of houses should pay continual attention to the drains being kept clean and in order by proper flushing, and the occasional use of hot water with soda and disinfectants. Care should be taken to remove, by means of a proper bucket provided in connection with sink trap, any grease that may have been collected therein from the scullery sink waste, or by the use of a special flushing rim trap automatically removing the grease; and by further keeping the various gully traps under rain-water pipes, and in yards for surface water, &c., well cleansed and charged with water above the sealing line, more especially in hot and dry weather.

(*To be continued.*)

NOTES ON
PRACTICAL SANITARY SCIENCE.

By WILLIAM H. MAXWELL.

Assistant Engineer and Surveyor, Leyton Urban District Council, Author of "Drainage Work and Sanitary Fittings," "Ventilation, Heating, and Lighting," &c., Certificates of the Association of Municipal and County Engineers, and Sanitary Institute.

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No. 43.

REFUSE DESTRUCTORS.

THERE is nothing new in the general principle of the treatment of refuse by cremation—it is a subject the sanitary importance of which has been recognised almost from time immemorial. Ancient history records that the purification of insanitary difficulties by fire was the mode practised by the Jews, Romans, and Greeks, and also by the natives of India. It is interesting also to notice that among the antiquities of ancient Rome is a pillar bearing the inscription—"Take your refuse further, or you'll be fined."[100] In Jewish history, too, we read that the valley of Gehenna or Topheth, where some of the Jews once sacrificed their children to Moloch, and which was subsequently regarded as a place of abomination, was made a receptacle for all the *refuse of the city* of Jerusalem, and that perpetual *fires* were kept burning in order to prevent pestilential nuisances.

As regards our modern English modes of disposal of refuse by fire, the practice and apparatus employed to-day are, like most other useful inventions, the result of much experiment and very many failures. It would, however, serve no useful purpose to give in detail,[101] even if it were possible, the particulars of all the various furnaces and machines which have from time to time been designed; but a brief summary of some of the more important attempts may be of interest as

[100] Lucian's "Ancient Rome in the Light of Recent Discoveries."

[101] For fuller particulars see paper on "Refuse Destructors," "Proceedings" Association Municipal and County Engineers, vol. xiii.

ndicating the course of the development of the cremation of refuse as we now know it.

Ordinary type furnaces, built mostly by dust contractors, were used in London and in the North some forty years ago, but they were unscientifically constructed and not adapted to the proper combustion of refuse. It was consequently found necessary to use coal or other fuel with the collected refuse to ensure its cremation. A furnace of this description was erected by the Corporation of Manchester about the year 1873.

An attempt was made in 1870 by Messrs. Mead and Co., dust contractors, at Paddington, to burn house refuse in closed furnaces. These were soon pulled down, as they failed to burn the refuse for want of draught, which defect was attributed to the furnaces being below the ground level. Mr. Codrington, however, observes [102] that, judging from a drawing, the great defect was want of sufficient area in the flue, which was only 1ft. 9in. square, for 110 square feet of fire grate.

About the year 1876, Mr. Fryer, Nottingham, erected one of his furnaces (which he styled the "Destructor" [103]) at Manchester, and others were added shortly afterwards. The towns of Birmingham, Leeds, and Bradford followed next in the erection of the "Destructor."

The furnace of Messrs. Pearce and Lupton, of Bradford, was invented about 1880, but after a fair trial in that town, conducted by the inventors, the experiment was abandoned.

Pickard (foreman at the Leeds Corporation Destructor Works) invented a refuse destructor which he called the "Gourmond." This furnace appears to have practically embodied the object of the more modern apparatus, the "cremator," in that it aimed at the purification of the gases given off from the cells by the action of fire.

Shortly afterwards Healey brought out his furnace, and a Fryer and Healey destructor was erected at Bradford. In this the purification of the gases was also attempted, but without the desired degree of success.

"Thwaites" apparatus consisted of a combination of a refuse furnace and boiler.

The furnace of Young, of Glasgow, consisted of an ordinary furnace with closed ashpits, into which air was blown by means of a powerful fan to assist combustion.

Mr. J. Wilkinson, of Birmingham, invented a furnace, and one of his type was erected at Blackpool. These furnaces are said to have cost a great deal for repairs.

Burton invented a long single furnace with two fires, the refuse being moved through by means of an endless chain.

The well-known "Bee-hive" was introduced by Stafford and Pearson, of Burnley. The accompanying diagram (Fig. 4) will suffice to illustrate the general arrangement of this destructor as erected in the parish yard at Richmond, Surrey, where two "bee-hives" were erected at a cost of £443 4s. 6d., including a chimney shaft 90ft. high, which were opened in 1884. These destructors were guaranteed to destroy 15 cwt. per hour for each hive, but they were constructionally weak, and the *wrought iron* furnace bars, which were destroyed with the heat in twenty-two weeks, had to be replaced by cast iron bars. The mode of charging the destructor was also faulty, and numerous contrivances in the shape of perforated dampers, baffle plates, &c., were inserted in the main flues with the object of intercepting the charred paper, dust, &c. There being considerable local opposition against the use of the furnaces, they were closed in June, 1885.

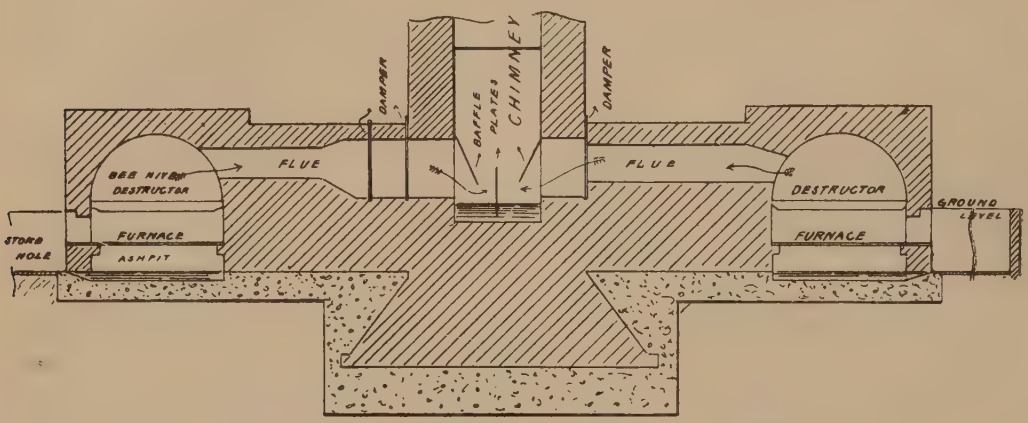


Fig. 4.—Section of the Richmond "Bee Hive" Refuse Furnace.

The "Bee-hive" was also erected at Bradford, where it was intended for the destruction of the market garbage and fish refuse, but as "the cost of wages and *fuel* amounted to over 4s. per ton of refuse destroyed, its use was discontinued." [104]

The "Nelson" destructor was patented in 1885 by Messrs. Richmond and Birtwistle, and an apparatus of this type was erected at Nelson-in-Marsden (Lancashire), but the construction of a larger destructor of an improved type has since been under consideration. Mr. T. Codrington, in his "Report on the Destruction of Town Refuse" (December, 1887), gives the following particulars as to the Nelson furnaces:—"There are three furnaces placed side by side consisting of horizontal fire grates 3ft. wide and 3ft. 6in. long, separated from each other by side walls, but com-

102 "Report on the Destruction of Town Refuse," by T. Codrington, M. Inst. C.E. (1887).

103 A somewhat inappropriate name, inasmuch as matter cannot be "destroyed," but simply changed in form.

104 "Proceedings" Association of Municipal and County Engineers, vol. xii., p. 106.

municating at the back with one drying hearth. For the purpose of experiment, apparently, the hearth is differently constructed opposite each furnace. Opposite the first it slopes from the back to the fire bars, and has apertures under iron shelf plates to admit heated air to the drying refuse. Opposite the second it is of fire-brick and level with the fire grate, and opposite the third it is sloping like the first, but of solid fire-brick. There are passages in the side walls of each furnace for the purpose of admitting air heated by passing through the walls to different parts of the furnaces. They open just above the fire-bars, and are intended to promote the combustion both of the refuse and of the vapours. The refuse is fed into openings at the back, and slides forward on the drying hearths to the fire grates, the products of combustion passing from the furnaces transversely over the refuse on the hearth, which constitutes, as it were, a part of the main flue. The middle hearth, which is level and forms a hollow between two inclined hearths, is intended for wet garbage, slaughter-house refuse, and excreta mixed with ashes. After leaving the furnaces the gases are passed over a coke fire on a fire-brick hearth, fed from above, and supplied with air through flues opening on a level with the hearth." In a trial in July, 1886, market refuse and garbage were burned at a cost of 2s. 9d. per ton for labour, and 1s. 9d. per ton for the coke furnace; the residuum, clinker and fine ash, were together over 50 per cent. of the refuse dealt with.

The apparatus invented by Hardie, of Burnley, consisted of an inclined furnace with a saddle boiler over, and it was proposed to dispense with chimneys by adopting the air-blowing principle.

(*To be continued.*)

It is a common thing to see children put money into their mouths. Seeing that babies make their acquaintance with the world by putting everything they can get hold of into their mouths, the danger may not be very great. There is some reason to believe that saliva has antiseptic properties. But one may readily conceive how diphtheria and other diseases, where the exchange from mouth to mouth has been made before the germs have been killed by drying, might easily be conveyed in this manner. It is a most disgusting and dirty practice, to say the least, and mothers should carefully teach their children never to put money in their mouths.

It is stated that numerous complaints have been made to London Vestries, particularly those in the western districts, as to the very dirty condition of the public thoroughfares; arising, it is alleged, from insufficient and defective scavenging, the sweepers in many cases being feeble old men employed in road sweeping as a means of relieving the poor rates. Mr. H. Lazarus will call the attention of the St. Pancras Vestry at its next meeting to the recent condition of Gower-street, Southampton-street, Upper Woburn-place, and other thoroughfares on the Bedford Estate. He will move that woodpaving be discarded in future, that the road sweepers be provided with working uniforms, and that sections of the roadways be entrusted to the care of individual sweepers held responsible for their condition.

PUBLIC GYMNASIA.

By Guy Cadogan Rothery.

It is a happy sign of the times that our leaders and rulers fully recognise the necessity of looking after the physical growth of rising generations. While, on the one hand, we have educationalists busily inculcating the "three R's," and on the other engineers and medical officers sweetening life by the promotion of practical sanitation, we also find a vigorous expansion of the "physical training" doctrine, and a widening of the basis of its application. Certainly physical training has never been held in too low an esteem at our great Public Schools, but the democratising of systematic physical education is only a comparatively recent movement in applied sociology.

In olden days sports on the village greens were common enough—racing, wrestling, and playing a rough game at ball kept young Hodge in good condition, counteracting certain bad tendencies engendered by too close an application to agricultural pursuits. The ancient games of Cornwall, Devon, and the Northern Counties may have been rather brutal, but they undoubtedly developed the bodies of young fellows, producing stout soldiers and sailors. But with the advent of a certain crabbed school of theologians village merriment was killed, the discontinuance of the village sports even awakening the alarm of that pedantic hypocrite James I., who penned a small volume pointing out the necessity of reviving the old games. Then came troublous times, followed by the purely artificial hilarity fostered by Charles the Profligate. After that we were busy again, and though village sports were revived, boxing and wrestling being specially encouraged, industrialism swooped down on us, and there seemed little time for play. Happily, however, the innate love of outdoor activity has never quite left us, and of late very real attempts have been made to systematise physical training and make it a living force among the people in town and country. Thus it is that we see physical training recognised as an important subject in primary schools for boys and girls. As regards gymnastics, we have certainly been largely indebted to our continental neighbours, for both in France and Germany the formal discipline to be obtained in gymnasiums has long been in favour with military and school authorities. Indeed, up to within a few years, the continental tendency was rather to over-exalt gymnastics. Unquestionably it is better to make pure gymnastics subsidiary to vigorous outdoor sports, as we find it in our own schools. But in crowded cities, where playgrounds are limited in extent and very different to green meadows or heath-covered commons, drilling and gymnastics are of greatest utility in the upbringing of children at the primary schools. Where drilling and simple exercises are practised little harm can be done even by the indiscreet, but where more important work is attempted greater care is requisite; and although teachers are grounded in elementary physiology and undergo a course of physical training, it seems advisable to go rather further in this direction. Of course in populous centres the school authorities can easily place the physical training, or, at all events, the supervision, in the hands of experts, male and female, but this is not always possible in smaller

schools, and then more should be expected of the head teacher.

Although gymnastic apparatus is useful, children and young people should only use it under competent supervision. This, unfortunately, is not always understood, and we occasionally find school gymnastic appliances accessible to children throughout playtime. This should not be, for accidents of a more or less serious nature may result, or bad habits be acquired. For the same reason we rather deprecate the policy adopted by some Local Authorities to erect somewhat elaborate gymnastic appliances, either in the open or in sheds in corners of public playgrounds. If these are not in charge of an attendant who knows something about the subject —rather an expensive matter—much harm may be done. Of course certain of the more simple appliances are quite suitable for school or public playgrounds, but these should always be carefully chosen with the advice of an expert, keeping well in mind that it is safer to be niggardly in this matter. Splendid work has been done for many years past in opening up parks and playgrounds for the public, where youngsters can romp and develope legs, arms, and lungs with some degree of safety to themselves and comfort to their elders. In connection with these open spaces giants' strides, well-constructed see-saws, and simple parallel bars can be safely allowed, but anything more elaborate must be looked upon with suspicion. The same arguments apply to schools. By all means let the school gymnasium be fitted up as lavishly as can be afforded, but keep it for serious work; only the most elementary appliances should be within the practically uncontrolled reach of the young people.

Various religious and social improvement societies have expended much energy and money in promoting physical training, and mainly through their agency many small towns and districts of large cities have been endowed with fine gymnasia, and by their means youthful workers find it possible to enjoy better health, owing to the exercise counteracting the bad effects of shop or factory life. Other classes of society, anxious to continue exercises began in school life, have called public gymnasia into existence. This tendency has also forced some Local Authorities to see what they can do to help the movement, and as a result we find many swimming baths emptied, planked over, and fitted up as gymnasia during the winter season. If such temporary establishments are under skilled management they serve a good purpose, and we hold that it is the duty of Local Authorities, as guardians of the welfare of the people, to see that only qualified individuals have charge of their transformed premises.

It is well to dwell upon the fact that gymnastics must be conducted on scientific principles, if good instead of harm is to be done. In competent hands such exercise is a means to health and general well-being; it is a genuine hygienic agent, not only capable of developing latent powers and keeping the body in a fit condition, but useful in controlling symmetrical growth and strength. Indeed, properly handled, it can become a curative agent, correcting malformations, giving the necessary fillip to weakened or partially atrophied parts of the system, arresting the descent towards chronic bad habits.

If we admit this — and we cannot do less than acknowledge its truth — it will be seen that it is of the utmost importance to health that the gymnastic appliances adopted for schools and elsewhere should be of the best manufacture and constructed on scientific lines, lines which admit of symmetrical training of individuals. It is not all training that is good, and certainly not all appliances that can be recommended. Some of the earlier apparatus used on the Continent rather encouraged foolhardy overtraining or straining, accounting for many of the breakdowns of persons who for a time stood high in the gymnastic world. In fact, gymnastics is a scientific branch of education, and as such, touching as it does on the health of the individual and community, it should be cultivated judiciously and under proper restrictions. Now-a-days all who are responsible for the management of large schools, orphanages, &c., pay considerable attention to the question, and as this tendency is, as we observed in the opening of the article, spreading vastly, it behoves all hygienists to study the subject in all its bearings.

IMPORTANT L.G.B. ORDER FOR LOCAL ELECTIONS.

THE parish meeting for the election of Parish Councillors in the present year will be held on Monday, the 14th of March, or on such other day not being earlier than Saturday, the 12th of March, or later than Wednesday, the 16th day of March, as may for special reasons be fixed by the County Council. The day of poll in the case of a contested election of Parish Councillors, and the day of election as regards the ordinary election of Rural District Councillors, Guardians, and Urban District Councillors in the present year will be Monday, the 4th of April, or such other day, not being earlier than Saturday, the 2nd of April, or later than Wednesday, the 6th of April, as in any particular case may for special reasons be fixed by the County Council. But it is necessary that in any parish in which polls for the election both of Parish Councillors and Rural District Councillors, or of Guardians and Urban District Councillors, as the case may be, have to be taken, the same day should be fixed for both polls.

Rule (1) of Part I. of the First Schedule to the Local Government Act, 1894, required that the annual assembly of the parish meeting should be held on the 25th of March in each year, or within seven days before or after that day. This rule rendered it very difficult so to arrange the dates for the proceedings at the annual election of Parish Councillors that one meeting should serve both for the election and for the annual assembly of the parish meeting. But by the Local Government Act, 1897, the rule above mentioned has been repealed, and it is provided that the annual assembly of the parish meeting shall in each year be held on some day between the 1st of March and the 1st of April, both inclusive. The difficulty in the way of one meeting being held both for the election of Parish Councillors and for the annual assembly of the parish meeting has thus been removed, and the dates in the New Parish Councillors Election Order have been so arranged as to admit of one meeting being held for the two purposes where this course is deemed desirable.

The Local Government Board, in making these announcements, adds the reminder that by the Ex-

piring Laws Continuance Act, 1897, the Local Government Elections Act, 1896, has been continued in force until the 31st December, 1898. Hence, if any difficulty arises in the present year with respect to any election of Parish or District Councillors or Guardians, or to the first meeting after any ordinary election of such Councillors or Guardians, or if from any election not being held, or being defective or otherwise, the Council or Board of Guardians has not been properly constituted, the County Council may, under Section 1 of the Act of 1896, by Order, make any appointment or do anything which appears to them necessary or expedient for the proper holding of any such election or meeting, and properly constituting the Council or Board of Guardians, and may, if it appears to them requisite, direct the holding of an election or meeting, and fix the dates for such election or meeting. Any such Order may modify the provisions of the Local Government Act, 1894, and the enactments applied by, or rules framed under, that Act, so far as may appear to the County Council necessary or expedient for carrying the Order into effect.

Section 1 (2) of the Act of 1896 expressly provides that a County Council may delegate their powers under the section to a committee, and the Local Government Board points out the importance of this power being exercised by the County Council. Cases came under the Board's notice last year in which advantage could not be taken of the powers conferred by the Act, because the difficulty to be met arose in the interval between the meetings of the particular County Council, and no committee had been empowered to deal with such matters.

The new Orders, of which the purport is explained in the above paragraphs, will now cease to be annual Orders, and have been so drawn up as to become permanent Orders, prescribing rules which shall, as far as practicable, apply to all elections.

A question having arisen last year in the Parish Council elections as to whether the demand for a poll could be withdrawn unless all the persons who made the demand joined in withdrawing it, express provision has been made in the new Rules on this subject. It will now be necessary, if the demand for a poll is withdrawn, that the withdrawal shall be made either by all the parochial electors who made it, or by such number of them that the number remaining is less than five or than one-third of those present when the demand was made, whichever number is least. If all the electors who made the demand for a poll withdraw it, the assent of the chairman to the withdrawal will in no case be necessary; but if some only of these electors withdraw the demand, and the number left is less than five or than one-third of those present when the demand was made, whichever number is least, the assent of the chairman to the withdrawal will be required.

GOOLE.—The Urban District Council has decided to send a deputation to consult Mr. De Rance, of Manchester, with a view to steps being taken to improve the present water supply or to obtain a new one. It has also decided to appoint a gas and water manager at a salary of £300 a year, instead of continuing the present dual control by sub-managers and a consulting engineer.

BIOLOGICAL SEWAGE FILTERS.

DR. REID has reported to the Staffordshire County Council on the experimental filters laid down at Tipton. Three experimental filters had been laid down by the District Council :—One of coke breeze, one of sand and gravel, and a third of sand and gravel aërated on Lowcock's principle of pumping air into the filter. The two former were completed in September, 1896, the last in January, 1897. In February, a coal filter was laid down by Mr. Garfield in substitution for the second. The three thus reported upon are the coke breeze, the Lowcock aërated, and the Garfield coal filters. At first the coke breeze filter—Dr. Reid gives no details as to its construction—was worked on Mr. Dibdin's charging and discharging principle, but later by a continuous flow of twelve hours followed a similar interval of rest like the other two. The Lowcock filter dealt with only half the proportion of sewage for the same area as the others. The purification per cent. estimated by removal of organic ammonia was 33·2 for the coke, 75·7 for the aërated, and 80·6 for the coal filter. Estimated from the diminished absorption of oxygen from permanganate solution, it was 29·0, 68·5, and 70·8 respectively. Considered from the point of view of oxidised nitrogen, the amounts were 0·38, 0·74, and 0·81 parts per 100,000 in the effluent against nil in the effluent as it reached the filter. A preliminary precipitation with the aid of alumino-ferric cake had apparently taken place in the effluent before it went to the filters. Perhaps this, with the non-inoculation of the filter and the constant stream together account for the coke breeze filter doing apparently so much less than at Barking and Sutton. At the latter it will be remembered that, without any preliminary treatment, the purification estimated by permanganate amounted to 86·5 per cent.

DRAINS AND TYPHOID.

CONTAMINATION of water supply, the eating of unwholesome shell-fish, and actual contagion, are the chief causes of typhoid. The remedy is so much in the control of Sanitary Authorities that the eradication of typhoid will be achieved *pari passu* with the advance of sanitation, and the appreciation of the fact that typhoid is a filth disease. Of course, drainage, with all its traps, sinks, pipes, &c., is a very complicated subject, but men and women must understand that smelling sinks, cesspools, and drains are poisonous to the inhabitants of the houses where they occur; and that not only are they the actual vehicles for conveying the germs of disease, but they cause a lowered vitality, and therefore a greater readiness to take disease. There is no doubt that there are a great many diseases caused entirely by imperfect drainage, and the increasing appreciation of this fact is doing much to dispel that doctrine which Charles Kingsley tried so hard to resist, and which Tennyson, in the poem of "The Village Wife," describes in a nutshell, thus :—

> "I thowt 'twear the will o' the Lord,
> But Miss Annie, she säaid it wus dräains."

PUBLIC HEALTH PROGRESS IN THE QUEEN'S REIGN (1837—1897).*

By T. RIDLEY BAILEY, M.D., of Bilston.

WE have recently celebrated the completion of sixty years of the reign of our Queen—a reign not only unprecedented in length in our history, but one the glories of which will be sung as long as England lasts. It is impossible to realise fully the marvellous changes that have taken place in the social, political, and commercial life of our country. Literature, art, and the drama have accomplished more than the most sanguine of their followers could have dreamt of; science has surpassed them in her achievements; and medicine—both curative and preventive—has a history not less worthy of being recorded. I must ask you to pardon my boldness in taking as my subject this afternoon, "The Progress in Public Health during her Majesty's Reign." Only a brief and partial sketch is possible within the limits of the occasion and of my own ability.

The state of sanitation and of sanitary knowledge throughout the country sixty years ago could hardly have been worse than it was. It is difficult for us to picture now the life and surroundings of the great mass of the people at that time, and only by reference to contemporary writings can we hope to know something of them. In the beginning of this century cholera, which had of course been known for hundreds of years in India, spread through Hindostan and ravaged nearly the whole of Asia. In 1831 it appeared in Europe, reaching England in October. In this country it continued for fourteen months, and on the Continent for six years. Among us it found conditions most favourable to its extension, and nothing can give us a better idea of the entire neglect of even the most elementary sanitary requirements than the description of the state of affairs revealed generally by the inquiries under the "Health of Towns" movement.

According to Rumsey, the arrangements for sewage and drainage of towns, and for cleansing the surface of streets, were most defective. Sewers were comparatively rare; such as existed were constructed on wrong principles, and cesspools were common. House drains were usually wanting, and, when present, had no connection with the sewers. The result was that the subsoil of towns was generally studded with sinks and cesspools; the surface of courts, alleys, &c., was covered with middens and refuse heaps, and the atmosphere laden with impurity and noxious gases. The drainage of land was rare, and stagnant water and filth common. The supply of water was deficient in quantity, inferior in quality, and most defective in the methods of its distribution to dwellings. Open ditches and foul water-courses laden with impurities existed in the towns and outskirts; offensive occupations and deposits were to be found on all sides; factories and workshops, which were erected anyhow and anywhere, were much overcrowded, while ventilation was conspicuous by its absence.

The houses of the poor were usually damp, closely packed in narrow streets and courts, built without regard to style or convenience, the sleeping-rooms small and overcrowded, entailing moral and physical degradation. Such structures invited and developed attacks of epidemic disease. The existing laws were quite inadequate for protection against local nuisances and for the promotion of necessary reforms. No proper authorities were in existence to administer the elementary enactments then in force, to promote a sounder view of public needs and personal habits, or to create and stimulate a desire for a better and a healthier environment. The local jurisdictions actually in force were inefficient, interfering with, and trespassing upon, each other's functions, and hopelessly preventing the proper execution of sanitary measures. Medical Officers of Health and Sanitary Inspectors were not even thought of. No central authority had been formed to exercise any control over Local and subordinate Authorities. Pauperism abounded, no less than 12 or 13 per cent. of the population in 1834 receiving relief from the Poor Rates. It is stated that "before the Poor Law Act of 1834 was passed, throughout four-fifths of England the majority of the inhabitants which had not the advantage of charitable infirmaries or dispensaries were attended under the Parish Medical Contract."

Only in the year of the Queen's accession was the Act for the Civil Registration of Deaths, Births, and Marriages, passed—an Act that was a necessary preliminary to the proper study of the etiology of disease, for the classification of the various causes of death in different localities, and for the determination of the influence of sex, age, and conditions of life on the public health—an Act which it is needless to say has been of the greatest possible service in the development of preventive medicine. Before that time, though the country had been frequently overrun with every kind of pestilence—typhus fever, small-pox, cholera, scarlet fever, and the like—no registration of the causes of death had been instituted. Indeed, it was largely, owing to the frightful mortality of the cholera in 1831—when 50,000 lives were known to have been sacrificed, though probably that figure was exceeded by many thousands—that a basis of future inquiry was provided by a careful collection of statistics. We see the result in the series of brilliant achievements in the prevention of disease that are among the greatest glories of this reign.

After this, a comparison could be made, *inter alia*, between the death-rate in different parts of the country, and on a "further examination of the difference in the general death-rates of towns and country districts, it was found that whereas the annual mortality per cent. of population was 1·8 in country districts, it was as high as 2·6 in town districts. In 1841 the Registrar-General pointed out that, whereas the mean duration of life in Surrey was forty-five years, it was not more than thirty-seven in the metropolis, and only twenty-six in Liverpool. Pulmonary consumption was also now ascertained to be one of the diseases which exhibited a striking excess in the case of town life. In fact, the general mortality was found to be increased 44 per cent. by the then condition of English towns and cities, and much that led to this excess of death was rightly held to be capable of remedy."

CHOLERA.

The history of cholera is most intimately associated with the record of sanitary medicine in this country. On four occasions this disease has in-

* Presidential address to the members of the Midland Branch of the Incorporated Society of Medical Officers of Health, October 7th, 1897.

vaded our shores, causing an enormous number of deaths, and leaving misery and despair on every side. The first visitation was in 1831—2, and though this does not, strictly speaking, come within the scope of my subject, the town in which I now reside suffered to such a frightful extent that a few remarks may be of interest and serve to show the sanitary conditions at the commencement of the period under review. In Bilston, with a population at that time of 14,492, there were in seven weeks no less than 3568 cases and 742 deaths, including two medical men. "The sanitary condition of the town," to quote the words of a local writer, "was deplorable. Foulness and filth were seen in the old-fashioned streets, in the low courts, and everywhere. Stagnant pools sent up their deadly vapours, sink holes their effluvia, and wretched hovels their thrice-breathed atmosphere. Undoubtedly the chief cause of this state of things arose from the character of the people, who, brought together in great numbers by the demand for labour in the vast mines and forges of the town, were composed of the worst characters, morally and socially, that could possibly be conceived—similar to the hordes of animated life that stream into some newly-found gold region. Being of degraded habits, and the houses numerically inadequate for the people's accommodation, they herded together like swine, the filth of their tenements and their persons thus giving strength to the venom of the avenger." It is added that "the cost of the funerals of the victims would have permanently drained, sewered, and watered every house that was visited; that policy and pity cried aloud for street and tenement reform, and demanded the opening of those large 'brick graves' called courts, alleys, and back squares, where the poor are buried alive, amid the gloom, damp, corruption, human scoria, and every other attributes of the churchyard, except its sanctity and peace." This epidemic was also extremely fatal in many parts of the country; Glasgow, for instance, showing a mortality of 2842, or 140 per 10,000 of the population.

It was natural that the pestilence passing over the whole land should stimulate observers to discover, if possible, its cause or causes. It was observed that in England, at least, isolated outbreaks occurred in the autumn of the first year, that the disease died out in winter and reappeared with great virulence in the spring or early summer. From this it was concluded that high temperature favoured, while cold retarded, the appearance of the disease. Further, it was known that it was always imported by persons coming direct from infected places, local outbreaks occurring in the seaport towns where they landed, and that it subsequently followed the line of traffic, showing that human intercourse was largely concerned in its propagation. This disease appeared for the second time in England in September, 1848. From that date until the end of March, 1849, only 988 deaths were registered, but in the summer following there was a rapid increase. During the year 1849 there were in all 53,000 deaths from cholera, besides nearly 20,000 from diarrhœa. The result was that there were no less than three official inquiries instituted. The report issued by the Board of Sanitary Works contained an interesting account of the progress of the epidemic from the East, and showed that the disease generally followed, as we have said, great lines of human communication by land and sea.

The second inquiry resulted in Dr. Farr's report to the Registrar-General—one of our English medical classics. In this brilliant paper, by the use of historical and typographical illustrations, the importance of the sites of towns and the effect of various degrees of elevation on the health of communities is clearly demonstrated. The statistics of cholera in London supported Dr. Farr's hypothesis that the number of deaths varied inversely according to the altitude of the localities.

The third inquiry, by the College of Physicians, derives its value chiefly from the researches of Dr. Baly. Among other things, Dr. Baly insisted on the relation of the disease to density of population. "He found that in the 134 more thickly-inhabited registration districts of England where the higher rate of mortality occurred, the population being 915 to the square mile, the deaths averaged 65 to 10,000 living. In the 404 districts of lower cholera mortality, there were on the whole 235 inhabitants to the square mile, and the deaths averaged only 7 in the 10,000, while there were no deaths from cholera in the remaining 85 districts, where only 122 persons on the average resided on a square mile."

In the August of 1853 cholera again showed itself in London and the North, and in the following year England had its third great visitation, the disease having come directly from the German Baltic ports. By the end of the year over 20,000 deaths in England and Wales were registered, in addition to a very large mortality from diarrhœa.

To Dr. Snow belongs the credit of first making the discovery that the cholera poison was contained in the evacuations, that the disease was propagated by the entrance of small quantities of such evacuations, mostly through contaminated water, into the alimentary canal. At the period referred to, all the sewers of London were discharged into the river Thames, from which the water for drinking purposes was taken by two companies—the Southwark and the Lambeth—and naturally cholera prevailed extensively among their customers. Between 1849 and 1854, however, one company—the Lambeth Company—had removed its intake further up the river, thus improving considerably the quality of its water. The result was most significant and instructive. Not only did the disease pick out, as it were, the various streets supplied by the Southwark Company, but Dr. Snow was enabled, after careful examination, to emphasise the difference by the following figures :—

	Population in 1851.	Cholera deaths in 14 weeks	Cholera deaths per 10,000
Houses supplied by Southwark Co.	266,516	4093	153
Houses supplied by Lambeth Co.	173,748	461	26

The well-known outbreak in connection with the pump in Broad-street, Golden-square, need only be mentioned. "There had been a few cases," says Bristowe, in his "Theory and Practice of Medicine," "in the neighbourhood during the month of August, which, up to the 30th, had resulted in 9 deaths. On the 30th, at least 8 cases, which ultimately proved fatal, occurred; on the 31st, 56; on September 1st, 143; on the 2nd, 116; on the 3rd, 54; and then daily until the 9th, 46, 36, 20, 28, 12, 11; after which the disease rapidly disappeared. No less than 616 persons were ascertained to have been attacked fatally with cholera within this area, between August 19th and September 30th, of whom at least 415 contracted the disease between August

31st and September 4th, inclusive." At this very time, too, the disease did not affect several groups of people living in the same district who had their water from a different supply, and there can be not "the shadow of a doubt that this sudden and evanescent outbreak was distinctly due to the use of the sewage-contaminated water of the Broad-street pump, occupying the centre of the affected area, the water of which was held in great repute, and was largely drunk by those who lived in its neighbourhood."

These and similar investigations clearly showed the cause of cholera in a large number of instances, but it was reserved for Thiersch, Sanderson, and others to show by experiments that the poison of cholera—which we now know to be a bacillus—is contained in the alvine discharges and infest the mucous membrane of the bowels.

"It was ascertained that when, under certain conditions, mice were fed with cholera evacuations, they were attacked with symptoms that proved rapidly fatal, and that both symptoms and *post-mortem* appearance had a very close resemblance to those which indicate human cholera. The chief points of likeness consisted in the rapidity and intensity of the disease; in a remarkable lowering of the temperature; in the accumulation in the intestines of thin fluid containing bacteria, other lowly organisms, and abundance of shed epithelia, and in the discharge of loose stools from the anus. The method adopted by Dr. Sanderson to infect the mice was to soak pieces of filter paper in fresh cholera evacuations, or in the contents of the bowels of patients who had died of cholera, to dry them, to ascertain by weighing the quantity of solid matter thus added to them, to cut them into pieces one inch square, to soak them in bacon fat, and then to administer them to the mice. The mice under these circumstances ate them greedily. The consequences were—that of mice fed with paper prepared from evacuations which had not been allowed to stand more than twenty-four hours, that is on the first day after passing, 11 per cent. were affected; that of those fed with paper prepared on the second day, 36 per cent.; that of those fed with paper prepared on the third day, every one; that of those fed with paper prepared on the fourth day, 71 per cent.; and that of those fed with paper prepared on the fifth day, 40 per cent. Paper prepared subsequently had no effect. These experiments show that the cholera evacuations have little or no intensity of action when perfectly fresh; that their virulence increases up to the third day, diminishing during the fourth and fifth days, and that they lose all specific properties after that date. The evacuations from the diseased mice produced the same effects on healthy mice as did true cholera evacuations; and further, all experiments made by Dr. Sanderson in the month of November failed absolutely, probably, as he suggests, on account of the low temperature then prevailing."

In 1866—the year of the fourth cholera epidemic—the water contamination theory received strong confirmation in the East of London, where the localisation of the epidemic was almost entirely due to the distribution to these districts of impure and unfiltered water by the East London Water Company. At the same time, further research, both at home and abroad, clearly showed that the laws influencing the incidence of cholera were very similar to those influencing typhoid fever, and that, in the words of Simon, "excrement sodden earth, excrement reeking air, excrement tainted water, are for us the causes of cholera." This epidemic was much less fatal than the previous ones, as a result, no doubt, of the partial removal of those conditions of filth which were known to be the essentials in the spread of cholera.

The mortality of the disease in the three epidemics is given by Sir R. Thorne-Thorne as follows:—

Cholera Mortality.

	England and Wales.		London.	
	Total deaths.	Deaths per 10,000 living.	Total deaths.	Deaths per 10,000 living.
1849 ..	53,293	30	13,565	51
1854 ..	20,097	11	10,684	43
1866 ..	14,378	7	5,548	18

As a result of the experience and discoveries of the last sixty years we have now no fear of cholera. If it should appear again on our shores—as indeed it has done more than once since 1866—our knowledge of its causes and the conditions of its propagation will enable us to prevent it spreading widely in the country.

In concluding this part of my theme, I will quote the words of Sir R. Thorne Thorne in condemnation of the antiquated system of dealing with the disease by quarantine, which to the credit and advantage of this country has now been abandoned: "The system of quarantine has again and again shown itself to be impotent for good, and being so, its vexatious and inhuman characteristics stand out the more prominently. Above all, it has a blighting effect on sanitary progress. So long as Governments tell their peoples that a line shall be drawn around them across which disease shall not pass, so long will those peoples be reluctant to spend their money on the promotion of true measures of prevention. The quarantining countries are essentially those which cholera invades. Taken as a group they are those where true sanitary progress is at the lowest ebb, and with the experience we have before us, I would in conclusion ask, much in the words I used at the Rome Conference, Is it likely that this nation will sacrifice her well-tried system of prevention for a restriction of five days' quarantine?"

(To be continued.)

THE PLUMBERS' COMPANY.

At the quarterly meeting of the Worshipful Company of Plumbers on December 29th, the Registration Committee was received by the Master and Wardens at the Guildhall, and were afterwards entertained at dinner, under the presidency of Alderman Richard Hind. Professor Garnett, Dr. Vacher, and the representatives of the National Association of Master Plumbers and the United Operative Plumbers' Association of Great Britain and Ireland, were among those present.

Mr. Bishop, past Master of the Company, spoke of registration as distinguishing a skilled calling from a trade one. Mr. W. Titmas referred to the old race of plumbers being better trained in workmanship than many in the present day. Mr. George Taylor expressed the opinion that the leading workmen of the period are equal to their predecessors in point of manual skill and superior in

technical knowledge. He urged the development of more practical instruction among the younger members of the craft. The Master of the Company spoke of apprenticeship being essential to the training of the plumber competent to execute sanitary work with safety to the public. Professor Garnett said the Plumbers were foremost among those connected with the building trades in recognising the value of technical instruction, and he pointed out that the Technical Education Board had encouraged the establishment of classes for plumbers in London. Dr. Vacher instanced the Liverpool Corporation as one among the larger municipal bodies which were alive to the importance of the plumbers' registration system as a branch of public health work.

ALLEGED INSANITARY PROPERTY.

AN important discussion *re* the legality of a sanitary order took place before Mr. D'Eyncourt, at North London Police-court, on Tuesday. The summons was taken out against Mr. Harold Morris (one of the City Commissioners of Sewers) in respect of the drainage of a house owned by him at Wyatt-road, Highbury.

Mr. Bramall appeared for the Islington Vestry; Mr. Bodkin was counsel for the defence; and Mr. Banister Fletcher had been subpœnaed for the defence.

The case was before Mr. Bros at this Court in November last, when the order was made that all sanitary defects should be remedied, but without specifying the particular work.

Mr. Bramall was proceeding to show wherein the magistrate's order had not been complied with, when Mr. Bodkin took objection to the summons on the ground that the Vestry had failed to comply with Subsection 5 of Section 5 of the Public Health Act, which said that if the person upon whom the order is made so requires the Public Authority shall specify exactly the work required to be done. Mr. Morris had applied on several occasions, and was now in the position of a man asking, "What will you have me to do?" Mr. Bramall replied that there was no doubt as to the defective drainage, and the only question was as to whether there should be the smoke or the water test. Mr. Bros had made the order upon the defendant to do what was necessary; and it would be a bad precedent for Mr. D'Eyncourt to re-open the case.

Mr. D'Eyncourt said he did not intend to do so. The best way would have been for the defendant to have mandamused Mr. Bros to further hear the case. He (the speaker) held that the order on the face of it was a perfectly good one, but he would grant an adjournment so that each side might interview Mr. Bros on the matter.

The adjournment was accepted.

TO OUR READERS.

The Editor solicits the co-operation of readers in making THE SANITARY RECORD *more attractiv by means of pen-and-ink sketches, photographs, and diagrams. There are many phases of sanitary work which lend themselves admirably to illustration. By this means not only individual articles, but the journal as a whole will be heightened.*

Sanitary Inspectors' Associations.

LONDON.

THE usual meeting of the Sanitary Inspectors' Association was held on Saturday, at the Carpenters' Hall, London-wall, E.C., under the chairmanship of Sir John Hutton, J.P., L.C.C., the President of the Association; supported by Mr. T. G. Dee, the Chairman of the Council; Mr. C. W. Raymond, the hon. treasurer; Messrs. W. W. West, I. Young, Ashdown, Legg, Henley, Bridell, Jordan, Barth, Alexander, Fairchild, Duck Shawcross, Moss Flower, and Mr. E. Tidman, the hon. secretary. After formal business,

The PRESIDENT, who was received with loud applause, gave the customary new year address. He said it was the universal desire of the Association to perpetuate the memory of the past presidents, and so it was proposed to form a fund, from which members could be encouraged in their studies and researches, in the interest of the public health. A liberal and practical proposal had been made by some of the members to found a Chadwick and Richardson Memorial Fund. An offer of a contribution of 50 guineas had been made provided that within nine months the fund be raised to 500 guineas. He thought the Association should not have any difficulty in carrying this out, if each member would help. Competitions for the prizes were to be held yearly, in such form as might be deemed best, either by having special contributions, or for the best papers read at the London or any branch meetings. Having referred to the successful visit of over one hundred members of the Association to Belgium, the President proceeded to remark that the salutation of the Association to all men is "Health and Long Life." Recently, the civilised world had been amused at the ornate style adopted in addressing a certain Emperor, but the Eastern salutation, "O King, live for ever," could be readily understood and appreciated when it was remembered that life is a symbol of power and creative force. To promote longevity was an aim and result of the work of the Sanitary Inspector. In 1660, the rate of mortality in London was 80 per 1000 per annum, but the death-rate in the county of London in 1896 was only 18·9. Many contributory causes had operated in producing that result, not the least of which in recent years was the zealous labour of the Sanitary Inspector. These figures were more remarkable considered in conjunction with the increased number of houses in London. In the year 1801, there were 142,042 houses in London; in 1831, they had increased to 246,839; while in 1896, they amounted to no fewer than 596,030. Then there was also an increase in the density of population; in 1801, only 958,788 persons lived in London; while in 1896, the population amounted to 4,443,018. The Sanitary Inspector specially dealt with certain forms of what may be designated preventable diseases—those over which, humanly speaking, man has control. No epidemic could resist clean houses, clean air, clean water—in a word, cleanliness. Many authorities could be cited to show that the present death-rate of 18·9, light as it is, could be still further reduced. No one could be familiar with the poorer districts of London without feeling convinced that this is so. Therefore, the

time had not arrived for the relaxation of any effort, but without an optimism which might lead to false security, they might feel gratified with figures that show how encouraging a result might be obtained under unfavourable circumstances. He believed that many Local Authorities would find an actual economy in increasing their staff of Sanitary Inspectors. There was a very laudable rivalry among some Local Authorities to keep their districts in the best possible sanitary order, but in others a falsely-called "economy" prevented the engagement of a sufficient staff of Inspectors, or, indeed, the payment of those already engaged on a sufficiently liberal basis. They were, in fact, just living down the old notion that a man who had failed in every other walk in life was the man to be appointed a Sanitary Inspector. Now the members of the Association were anxious to secure by competitive examination the very best men to fill any vacancies, and there was no fairer or more popular way of selecting those who presented themselves for the public service, and the following had been suggested as the constitution of an examining Board: Three members to be nominated by the Local Government Board, two by the Sanitary Institute, and one each by the following bodies: the Society of Medical Officers of Health, the British Institute of Public Health, the Worshipful Company of Plumbers, the Worshipful Company of Carpenters (to whom the Association was so much indebted for the use of their hall), the Royal Institute of British Architects, the Association of Municipal and County Engineers, and the National Health Society. He hoped that this useful work would be accomplished before long, for anything tending to improve the status of the Sanitary Inspector would be greatly to the advantage, not only of themselves, but also to the general public. At present the Association consisted of 592 ordinary members, 52 honorary members, and 26 associates, actuated by one common desire and object. In their ranks would be found men of distinction, together with members of the Institute of Civil Engineers, Sanitary Institute, Incorporated Association of Muncipal and County Engineers, Surveyors' Institute, and Society of Architects. Theirs was not a London Association, but one which extended over the United Kingdom, and as their friend he warned them that there was no surer way to reduce their power and authority than by any attempt to cut up this compact body into independent associations. As an illustration of the reasonableness of their claims in regard to superannuation, a paragraph in the memorandum of their Bill could be aptly quoted: "Sanitary Inspectors are engaged in the performance of duties which almost daily endanger their health and lives, viz., investigation of the causes of and the abatement of dangerous nuisances, investigation into the causes of infectious disease, and the taking of the necessary measures to obtain and carry out isolation and disinfection." Upon the fearless discharging of these duties by Sanitary Inspectors depended to a large and increasing extent the health of the community, and the late Parliamentary Secretary of the Local Government Board, stated that "the mortality among Sanitary Inspectors is greater than among soldiers in wartime." In equity, therefore, they were entitled to special and commensurate protection and provision for themselves and those dependent upon them should they become victims in the execution and conscientious discharge of their duties. The provision for a contribution from salaries made in the Bill was in accordance with the spirit of the age; and, further, it was the method adopted by the London County Council in its recent Superannuation Act, which in practice worked perfectly. An amendment of the terms of the tenure of the Sanitary Inspector's office was also of great importance. The present position, he said, is that whilst the Public Health (London) Act, 1891, had secured a permanent tenure of office in the case of Medical Officers of Health, Sanitary Inspectors had to accept appointments on such conditions as the Local Authorities think fit. The result was that Inspectors were dependent on the goodwill of individual members of the bodies appointing them, and the consequence naturally followed that Inspectors were liable to be influenced in the discharge of their duties from fear of offending those on whom they were dependent, and might thus be deterred from calling attention to defects to remedy which would involve expenditure by members of Local Authorities, who are the owners of property subject to inspection by the officer whom they appointed, and the renewal of whose appointment is in their hands. Foulness was the source of disease, and cleanliness is its preventive. Although science had come to their aid in many ways, cleanliness was an immense factor in all practical sanitary work. The question of the purity of the water supply to London would, he hoped, receive the early attention of thoughtful people. He would not refer to committees and commissions which had resulted in dangerous delays and increased complications, but he should not be surprised to find that London in a few years might have mournful cause to regret her suicidal neglect of securing a new source of supply. A tidal river could not, under the most favourable circumstances, be an ideal source of water supply for so large a section of the vast community of this city. Such an epidemic as that which afflicted Maidstone—where, strangely enough, the total number of cases stood at 1897, the number of the year just closed—might at any time attack London with consequences too alarming to contemplate, and he was convinced that Londoners should protest strongly against this happy-go-lucky policy in dealing with water supply. In concluding, Sir John said, "Your successes in the large field of sanitary work are not to be gauged by the number of convictions obtained through your instrumentality, for prevention is better than cure. You are the ministers of health to all classes, and especially to the teeming population of workers in this great city, a sacred trust, and amid the many discouragements you may meet with, let the priceless possession of a clear conscience add further to your zeal, to your praise, and to your country's good." (Loud applause.)

Mr. T. G. DEE (Westminster) proposed a hearty vote of thanks to Sir John Hutton for his address; this was seconded by Mr. W. W. WEST (Walthamstow), and supported by Messrs. LEGG (Hackney), Mr. T. C. MOSS FLOWER, C.E., Mr. SHAWCROSS (Lancs), and Mr. W. H. GRIGG (Fulham), Mr. DUCK (Plumstead), and Mr. H. ALEXANDER (Shoreditch), and carried with acclamation. Several of the speakers referred to the President's remarks upon the proposed constitution of Examination Board, and urged that the policy of the Association had always been that upon any such body the

Association, as comprising practical Sanitary Inspectors, should be represented on it.

Sir JOHN HUTTON, in replying, concurred in this view, and expressed the conviction that any Board nominated by Government should be one on which the Association was largely represented. He referred to the noble work done by the two past Presidents, and as a mark of his gratitude and appreciation of their labours, announced that towards their memorial fund he would be pleased to be allowed to contribute fifty guineas. (Applause.)

The usual private conference of members was then held, and the proceedings terminated.

DIPHTHERIA AT PUTTENHAM.

AT the last meeting of the Guildford Rural District Council, the Medical Officer reported that sore throat had for several weeks been very prevalent at Puttenham, culminating in two houses being invaded during the past month with a very virulent type of diphtheria. Three children were attacked in one house, and two in another. They were all removed to the hospital, and the three former succumbed from toxine poisoning and cardiac paralysis. The Medical Officer reported that it was only fair to state that two of the patients were in a hopeless condition on admission, whilst the third soon developed symptoms of blood poisoning. The Rector had closed the schools. Three cases of erysipelas had been notified from Merrow, Worplesdon, and Shere respectively. Sore throat and attacks of diphtheria had not been uncommon at Puttenham—especially the former—during the last three or four years, to say nothing of the geographical position of the village, lying low in a hollow beneath the Hog's Back, and so protected from the purifying effects of wind currents, the village itself is one long urban street. The gardens are small, and in some cases there are none at all, and in the absence of any attempt at scavenging the ground in close proximity to the residences has, it appears to me, become saturated with sewage, and this naturally predisposes to sore throat and other sickness. Some of the water supplies have proved very impure, probably owing to sewage pollution. Several of the principal inhabitants had consulted him and the Surveyor as to a solution of the difficulty, and he had informed them that, in his opinion, nothing would tend to improve the healthiness of the village so much as a good scavenging scheme or a sewer right through the village. The former would not be a heavy tax on the parish; on the other hand, given a suitable outfall, the gradients of the village street were well adapted for a small sewer. A committee was appointed to consider the matter, and report to the Board.

LONDON, E.C.—Clerkenwell has been smitten with a serious epidemic of measles, which has been traced to the Sir Hugh Myddelton Board School, in connection with which no less than seventy cases have been reported. All that can be done is that which was recommended by the Vestry of Clerkenwell to the School Board—to extend the Christmas holidays at this particular school by a couple of weeks, in order that the disease may be stamped out.

Reviews.

Humanitarian Essays: Being Volume III. of Cruelties of Civilisation. By MAURICE ADAMS and others. Edited by HENRY S. SALT. Price 1s. William Reeves, 185, Fleet-street, London, E.C.

THIS is one of the Humanitarian League's publications, and contains seven essays. Mr. Maurice Adams, on the "Sweating System," shows how six Inspectors, four juniors, aided by ten assistants, are supposed to look after over 10,000 factories, and upwards of 18,000 workshops in London and neighbourhood, and quotes Victor Hugo:—"In England they venerate so many laws that they never repeal any. They save themselves from the consequences of their veneration by never putting any of them into execution." For the full solution of the problem, Mr. Adams looks forward to the growth of sympathy, guided by reason, which shall intelligently organise the whole of life in accordance with insight and love.

In the "Gallows and the Lash," Mrs. Bonner advocates indeterminate sentences for first offenders, which would probably include half the murderers; the abolition of the capital punishment, and the imprisonment for a term in the discretion of the judge. We agree with the authoress that the death penalty does not deter either in England or abroad; but we are not prepared to support the abolition of flogging, which might be more frequently carried out in cases of unprovoked personal assault.

In the "Shadow of the Sword," Mr. G. W. Foote points out that of every pound of taxes 16s. 1½d. goes for war, war debt, or preparation for war. We are not of the same mind with our author, that "war is the game of sovereigns and statesmen," but rather that "war is just in self-defence, or in defence of a neighbour unjustly attacked."

Probably the remedy may be found in Europe, at least by a Union of States:—

> "Till the war drums throb no longer, and the battle flags are furled,
> In the Parliament of man, the Federation of the World."

Mr. H. Roberts, in "Public Control of Hospitals," desires that the hospitals should be taken over by the County Councils, who should elect a board consisting of a majority of their own members, and a minority of surgeons and physicians elected by the hospital staff. The hospitals to be thrown open to all who cared to use them, provided they were ill enough, regardless of class or character—a form of State Socialism likely to stop the perennial flow of charity.

Mr. J. Collinson, in "What it Costs to be Vaccinated," shows by statistics the evil effects of the system, and points out, no doubt to his own satisfaction, how the disease can be eliminated by careful sanitation, without running the risk of inoculating the patient with some other disease.

"The Humanities of Diet," by H. S. Salt, is an earnest appeal advocating from the vegetarian point of view the humane protection of the lower animals.

The series concludes with an appeal to teachers to discourage cruelty and cruel sports, and to preach and practise kindness to animals.

Children under the Poor Law: their Education, Training, and After-care, together with a Criticism of the Report of the Departmental Committee on Metropolitan Poor Law Schools. By W. CHANCE, M.A., Trinity College, Cambridge, Barrister-at-Law, Hon. Sec. Central Poor Law Conferences. Author of "The Better Administration of the Poor Law." Price 7s. 6d. Swan, Sonnenschein, and Co., Ltd.

THE author of this book, in dealing with a subject which to most people is of the "dry-as-dust" order, has succeeded in producing a volume crammed with valuable and interesting information and teeming with references and authorities.

Mr. Chance describes at length the various methods of dealing with children in workhouse, district and separate schools, cottage homes, and isolated homes, the use made of public elementary schools and the boarding-out system. The two main disadvantages of workhouse schools are first the difficulty of securing and retaining good teachers, and the second the monotonous life led by the children; there is also the evil of close contact with adult paupers. In the district and separate schools the children are separated from adult paupers, they have permanent teachers, and the future of the children is assured; on the other hand, they lead barrack-like lives, and there is the loss of the family tie. With the cottage homes there is a certain kind of family life, and the health results are better. In the isolated homes the institutional life is abolished, and the children are more in contact with every-day life; it is the nearest approach to family life, and the education received at the neighbouring Board Schools is far superior to the ordinary workhouse schools. The defect in the boarding-out system appears to be that so many cases of cruelty to, and neglect of, children go undetected; therefore, to be successful, a most stringent supervision must be exercised by the boarding-out committees.

We have it on the authority of Miss Mason, a special Inspector for boarded-out children, that the immortal Oliver Twist was brought up in an isolated home, and was not, as many suppose, a workhouse child. The school to which he was relegated was under the parental superintendence of an elderly female, who professed much affection for the "dear children," and whom Mr. Bumble called a humane woman. Boarding-out and small homes are no new things; what is new is the system of safeguards which now surround them, and without which, unless carefully applied, they will revert to the conditions described by Dickens.

Some of our readers may be unaware of the fact that Boards of Guardians have nothing to do with the education of those children who are classed as out-door paupers. On January 1st, 1896, 54,052 children were receiving indoor, and 184,437 out-door relief. Of the 54,052 children, only 24,475 were being educated in Poor Law schools, the great majority attending the public elementary schools.

Mr. Chance does not advocate any particular system. One system, he says, "suits one locality better than another, while a combination of systems is also useful." To anyone who is interested in the manner of the up-bringing of the units who go to make up the future men and women of the Empire, to those who are deep in the work of Boards of Guardians, and to all those who desire only to glean something of the good work being done under the Poor Law for our children, we commend Mr. Chance's work as being readable and up to date. It is satisfactory to learn that the children from the Poor Law schools seldom come back to the workhouse at any time during their lives. The children have, in fact, been depauperised, and many of them have mounted high in the social scale. To quote but a few instances: One boy is now the head master of a large Board School in Bristol, another is sub-librarian at the Birmingham School of Art, and another is a scout at All Souls' College, Oxford.

General News.

BOGNOR.—A sum of £150 is to be expended for the erection of public conveniences. A further sum of £230 is proposed for similar purposes.

FINEDON.—A committee of the Urban District Council is making arrangements for the acquisition of the land necessary for a proposed water supply.

ARDSLEY.—The Urban District Council is applying for sanction to borrow an amount necessary for the purchase of a road-roller and scarifier.

BROADSTAIRS AND ST. PETERS.—The Local Government Board's sanction has been received to the proposed borrowing of £1060 for the provision of public conveniences.

LOWESTOFT.—The Town Council has resolved to apply to the Local Government Board for sanction to a loan of £10,000 for conversion of the privies existing in the borough into water-closets.

PADDINGTON.—The Vestry has agreed to rescind the resolution authorising a public lavatory to be constructed in Pickering-place for females as well as males, and to substitute in lieu thereof a resolution providing for the erection of a lavatory for men only at a cost of £1800.

WOLVERHAMPTON.—The Public Works Committee invite designs and tenders for motor vans for street scavenging and the conveyance of road materials. Outline specification and form of tender can be obtained on application to Mr. J. W. Bradley, C.E., Borough Engineer and Surveyor, Town Hall, Wolverhampton, firms tendering to do so at their own cost in every respect.

LEITH.—For the year 1897 the deaths in the burgh of Leith numbered 1511—males, 762; females, 749; being equivalent to an annual death-rate of 20 per 1000. The deaths from infectious diseases numbered 212, including 92 from measles, and 68 from whooping-cough. The new infectious cases notified under the Notification Act totalled 640—typhoid, 56; small-pox, 3; scarlet fever, 412; diphtheria, 71; membranous croup, 7; erysipelas, 86; puerperal fever, 4; continued fever, 1. 384 cases, including measles (49) and probationary cases (10), were removed to Leith Public Health Hospital, East Pilton. According to the figures given, by far the most fatal of the infectious diseases during 1897 were measles and whooping-cough, which between them killed 161 persons, mostly children—that is, over three times as many as died from all the other infectious diseases put together.

GRAVESEND.—Formal sanction has been received from the Local Government Board for the loan of £121 for a mortuary.

DARWEN.—The Health Committee has decided to obtain tenders for providing different makes of destructors for house refuse.

CIRENCESTER.—The Rural District Council has agreed to an arrangement with the British Institute of Medicine to examine bacteriologically and report upon morbid products in doubtful cases of diphtheria and typhoid fever at a charge of 2s. 6d. each.

COLWYN BAY.—Fresh plans of the proposed infectious hospital have been forwarded to the Local Government Board. The cost is allocated as follows:—Hospital buildings, £795; administrative cottage, £585; laundry, mortuary, and disinfecting apparatus, £390; fencing in site, £280; cost of site, £450. Total, £2500.

SHREWSBURY.—The Local Government Board inquiry in reference to the proposed river water scheme for the borough of Shrewsbury was resumed on the 31st ult. The Chairman of the Finance Committee said the cost of the proposed river scheme would be £48,000. In the event of the adoption of an efficient scheme certain economies and other savings could be effected, which would save £2081 per annum in the present working expenses. This would enable the Corporation to borrow £40,000 at 3 per cent., repayable in thirty years, without any increase in the rates. Mr. G. F. Deacon, civil engineer, gave evidence in support of the Church Stretton scheme. He estimated the total at £106,000. The inquiry was again adjourned.

LIVERPOOL.—Mr. George Johnson, senior Inspector in the Sanitary Department of the Corporation of Liverpool, in whose employ he has been for forty-four years, was last week, on retiring from the service, presented by his late colleagues with a handsome marble timepiece and vases. For no less than thirty-two years Mr. Johnson has laboured in the sanitary reformation of Liverpool. His knowledge and experience of things as they were in the birth and infancy of public health work is in a way unique, and many an interesting and even thrilling chapter of reminiscences has he related to his *confrères* of a later and more prosaic age, which, could they be perpetuated in print, would add an uncommon chapter to the early history of the sanitary service. Liverpool has been a training school for Inspectors, and probably no man has given more initiatory lessons to Sanitary Inspectors than the subject of our notice. Having regard to the fact also that in his work he made no enemies but many friends, and was ever a *persona grata* among his wide circle of present and former colleagues, it was fitting that the official close of such a useful and honourable career should be recognised with more than words, good as are the congratulations of one's friends. The testimonial fund was warmly supported, and Inspectors N. Coates and J. Cangley, with Messrs. Dillon and Jenkins, of the clinical department, were delegated to make the presentation at Mr. Johnson's home. Messrs. Coates and Dillon feelingly voiced the admiration and goodwill of the subscribers towards Mr. Johnson, who suitably replied and thanked them for their great kindness. Our best wishes go with the veteran in his well-earned retirement.

HUNTINGDONSHIRE.—Mr. D. M. F. Gaskin, M.I.C.E., of Liverpool, has been retained by the Council to investigate the water supply of the district.

THETFORD.—The water from the Thetford Water Works has just been analysed, and found to be entirely free from sewage or drainage impurities, and is an excellent water for drinking purposes.

BISHOP AUCKLAND.—The Urban District Council has instructed Mr. D. Balfour, M. Inst. C.E., Newcastle-on-Tyne, to report as to new filter beds proposed at the waterworks for the supply of the town of Bishop Auckland.

SCARBOROUGH.—A special meeting of the Sanitary and Lighting Committee was held recently to further consider the question of a site for the proposed destructor. Messrs. Barr, Hirst, Levitt, and Smith presented a copy of the resolution passed at a previous meeting, together with a petition against the erection of the destructor in the Old Gaol buildings, signed by 500 ratepayers. After some discussion it was decided that all the members of the Town Council should visit Bradford to inspect the Horsfall destructor erected on the Hammerton-street site. It was further decided to inspect the refuse destructor at Cambridge early in the new year.

CLOUGHTON.—Cloughton, near Scarborough, where is situated the country and marine residence of the late Sir Frank Lockwood, Q.C., M.P., is highly dissatisfied with its water supply, which is now in the hands of a company. At a public meeting of the inhabitants, held recently, Mr. W. C. Allanson, a prominent ratepayer, said that he had not a plentiful supply in his house, and what there was stank. He could show any of the directors a glass of water which was as red as a fox and unfit for any person to drink. Some of the pipes now in use were put down in 1874, and they were only old gas pipes. The Duchy of Lancaster, who own most of the land and property here, only required £10 for a spring, and what was that amount when a supply of good water was in question? It was resolved to ask the District Council to take the necessary steps to procure an adequate supply of pure water.

Personal.

DR. L. ROBERTS has been appointed Medical Officer for the district of Caerwys.

MR. W. B. HARMER has been re-elected Sanitary Inspector for the rural district of Circencester.

DR. C. E. PATERSON has been appointed Medical Officer for the Frimley district of Farnham Union.

DR. DENING has been reappointed Medical Officer, and Mr. J. Vann, Inspector of Nuisances, for the district of Stow-on-the-Wold.

THE salary of Mr. Stilgoe, the Borough Surveyor for Dover, has been raised by £100 per annum, the increase to commence from October last.

IT is proposed to appoint Mr. W. A. Chamen, chief assistant to the Crompton Company, London, as Electrical Engineer under the Glasgow Corporation, at a salary of £800 per annum.

Dr. O. GETHIN JONES, M.D., has been appointed Medical Officer for Porthcawl.

DR. GEPP has been appointed Medical Officer of Health for the district of Newport.

MR. A. GARDNER has been appointed Medical Officer of Health for the rural district of Kirkley Moorside.

MR. E. H. HOUFTON has been appointed Medical Officer of Health for the urban district of Mansfield Woodhouse.

THE Local Government Board has sanctioned the appointment of Dr. F. E. Streeter as Medical Officer of Health for New Swindon, at a salary of £100 per annum.

Sewerage Schemes.

[TO MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

THE Surveyor for Dunstable is preparing plans of the land available for irrigation by gravitation on the Luton-road site.

THE Thames Board of Conservators is forcing a drainage scheme on Wendover, and Mr. Fawcett has prepared a scheme, costing £2000.

THE specifications for the sewage outfall works at Buckfastleigh are to be passed, subject to any alterations the committee might make, and it has been decided to invite tenders.

AT the last meeting of the Baildon District Council it was agreed to apply to the Local Government Board for sanction to borrow an additional loan of £350 for works in connection with the sewerage of Tong Park.

THE Uxbridge Urban District Council has received formal sanction to the borrowing of the sums of £4397, £12,647, £5568, and £12,210 for purposes of sewerage and sewage disposal for the parishes of Cowley, Hillingdon East, West Drayton, and Yiewsley respectively. The consideration of the Hayes drainage has been postponed.

THE Town Clerk has written the Rural District Council of Guildford in reference to the proposal that the sewage of Stoke-next-Guildford should be received at the borough outfall works, that as the district had been enlarged since the commencement of the negotiations it appeared to the Council to be most important, and to the interests of all parties, that the sewage likely to come from Stoke should be properly treated at the borough outfall works. The Town Council therefore proposed to consult an expert on this point, and on the general management of its works, and pending this report the Council could not give the Rural District Council any more definite reply to the inquiry addressed to . The letter was referred to the Drainage Committee.

THE Eton Urban District Council has decided to apply for a loan to carry out the new system of drainage which it is proposed to adopt.

THE Dawlish Urban District Council has appointed Mr. T. Pearse, of Plymouth, as Clerk in connection with the new sewerage scheme, at a salary of £2 10s. per week.

MR. SIMPSON, Engineer, has presented to the Barrow Urban District Council a sewerage scheme, the cost of which is estimated at £4750. The matter has been referred to the Syston Parish Council for consideration.

THE Guildford Rural District Council has accepted the tender of Messrs. Streeter Brothers, for the carrying out of works of sewerage and sewage disposal at Shere, at £909; and has decided to apply to the Public Works Loan Commissioners for a loan of £950 for the work.

A DECISION of much importance to Local Authorities has just been communicated by the Local Government Board in Church District Council. Thousands of pounds have been spent in the equipment of Accrington and Church outfall sewage works, but land filtration is not included, and the Local Government Board has intimated that no borrowing powers will be sanctioned for the construction of sewers in the district emptying into these works.

A LOCAL Government Board inquiry has been held at Old Hill into an application made by the Rowley Regis District Council to borrow money for the purpose of connecting houses with the sewers. Mr. Bassano explained to the Inspector that a general system of drainage was being carried out throughout the parish, and the Council was desirous of obtaining a loan for £15,000 for the purpose of making house connections. At Tividale the connection had been made to the whole of the houses, excepting about twenty, and progress was being made with the work in other parts of the parish.

THE Local Government Board has written the Honiton Rural District Council stating that it had been advised that the drainage scheme was unsatisfactory in many respects, the chief of which were (1) That the filter effluent was proposed to be discharged into the river without previous treatment on land; (2) that no provision was made for thoroughly examining the existing sewers and remedying their defects, and providing means for inspection, ventilation, and flushing; and (3) that it was not proposed to connect the two existing sewers so as to form one system. The Board considered that whatever process of tank treatment was adopted, sewage should be purified by irrigation on an adequate area of suitable land before the effluent was discharged into a river. It was, therefore, suggested by the Board that the matter should be re-considered with a view to the preparation and submission of a fresh scheme, which would make provision for the treatment of the sewage on the lines indicated.

A DEPUTATION from the Corporation of Manchester visited Glasgow recently and inspected the Dalmarnock sewage works.

A LOCAL Government Board inquiry has been held at Padiham into the Council's application to borrow £10,151 for works of sewerage, and for the erection of a river wall and boundary walls at the storeyard.

THE Hungerford District Council and Parochial Committee have decided to adopt Mr. Hives's scheme for the drainage of the town. It has been decided by the Parish Council to convene a meeting for discussing the subject.

THE Swindon New Town Urban District Council has decided to construct the two acres of artificial filtering beds at the sewage farm at an estimated cost of £2500, which work the Council will carry out itself under the direction of the surveyor, Mr. H. J. Hamp.

THE Sanitary Committee of the Leatherhead District Council has been directed to prepare an estimate of the cost of adopting the Congleton system of sewage treatment, by which Mr. Pott believes a saving of between £200 and £300 a year will be effected.

A MEETING was held recently at Corsham for the purpose of taking into consideration the two schemes of drainage for Pound Hill, the first involving the expenditure of £2500, and the second £698. After a long discussion it was decided to call a parish meeting to further investigate the matter.

THE Urban Council of Aylesbury has agreed that no system of sewage disposal, bacteriological or otherwise, will be satisfactory until the storm water is separately treated. Mr. Locke showed that 114 million gallons of storm water passed through the sewage works annually, and the extra cost of pumping involved was £450. A special drain to cost £4000 would, he thought, reduce the quantity by one-half.

A LOCAL Government Board inquiry has been held at Urmston into the application of the Urmston District Council to borrow £2270, and of the Barton District Council to borrow £1130 on behalf of the parish of Flixton. The joint sewerage district was constituted twenty years ago, and the sewage works have been in existence about fifteen years. Settling tanks are to be provided in order to ease the land. The population of Urmston is now about 10,000, and is rapidly increasing, and the rateable value amounts to £26,600. Mr. C. C. Hooley, surveyor, who gave details of the works proposed to be carried out, said there was only one manufactory in the district, and no effluent from breweries or dye works had to be dealt with at the works. After treatment the effluent from the sewage works was passed into the Ship Canal.

Lighting.

OWING to boisterous weather on the west coast of Scotland the electric light has been damaged.

THE Town Council of Bury St. Edmunds has resolved to apply to the Local Government Board for power to borrow £29,000 to carry out electric lighting.

THE Crewe Town Council has decided to apply to the Board of Trade for a Provisional Order authorising it to supply a system of electric lighting for the borough.

A LOCAL Government Board inquiry has been held at Portsmouth into the application of the Corporation for permission to borrow £21,000 for purposes of electric lighting.

THE Lighting Committee of the Dumfries Town Council has resolved to experiment on two lamps with the apparatus for supplying a gallon of hot water for a halfpenny in the slot.

THE ratepayers of River recently polled on the question whether the Lighting and Watching Act, 1833, should be adopted by the parish. The voting resulted in a tie, and consequently the proposal was defeated.

A LOCAL Government Board inquiry has been held at Salford into the application of the Town Council for sanction to borrow £13,000 for purposes of electric lighting. It is proposed to extend the electric cables, and erect a cumulative station under the Regent-road Baths.

Correspondence.

We do not in any way hold ourselves responsible for opinions expressed by our correspondents.

(*To the Editor of* THE SANITARY RECORD.)

LEEDS SANITARY CONGRESS — SURCHARGE OF DELEGATES' EXPENSES.

SIR,—At the commencement of the present year application was made to my Authority to appoint representatives at the forthcoming Sanitary Congress, which it was proposed at the time to hold at Leeds in the month of September. The Health Committee thereupon duly appointed the chairman and myself as delegates, and the resolution was duly placed on the agenda book in the form of a minute of committee, which was subsequently confirmed by the Council. In accordance with this resolution, the delegates in due course attended the Congress at Leeds, and the accounts for out-of-pocket expenses were submitted to a subsequent meeting of the Committee. In the meantime the Local Government Board auditor visits the district for the purpose of making his annual audit of the Local Authority's books, and in due course promptly surcharges the members of the Council (who signed the cheque) with the amount paid to

the surveyor and gas engineer (two separate officers) for expenses incurred in attending meetings of the Gas Institute and Municipal and County Engineers' Association held at London and Brighton. He has also intimated his intention of surcharging any similar account, as he contends that such expenditure is illegal, so far as officers are concerned, the conference regulations only applying to the clerk, and the amount allowed under those regulations to the members of the committee and their clerk is only 7s. 6d. per diem, and 15s. per night when away from home on *legal* journeys.

Can any of your numerous readers inform me where district (Local Government Board) auditors have adopted a similar course of action, or where I can find the details of accounts which are "contrary to law," and which, I take it, is the basis of all surcharges?

If this course is to be adopted by Local Government Board auditors throughout sanitary districts generally, I am afraid the delegates from Urban and Rural Authorities at forthcoming Sanitary Congresses will be very few.

I may say the Health Committee are quite willing to pay the expenses of their delegates, but cannot see their way to pass the account under the circumstances, as the amount would have to be refunded to the chairman of Council and Finance Committee at the next annual audit.

SANITARY CONGRESS DELEGATE.

December 28th.

Obituary.

DR. MONTGOMERY WARD.

WE regret to announce the death of Dr. Montgomery Ward, which occurred suddenly on Thursday morning, December 30th, at his residence at Rathmines. The deceased gentleman had been suffering from influenza for over a week, but the immediate cause of death was heart failure. The deceased surgeon was a highly respected and much esteemed member of the medical profession, in which he occupied a foremost position. For many years he was Medical Officer of Health to the Rathmines Town Commissioners, and he enjoyed a large and fashionable practice in the township. He was recently elected Visiting Surgeon to Mercer's Hospital, in succession to the late Surgeon O'Grady, whom he has not long survived.

A LOW DEATH-RATE. — At a meeting of the Eastbourne Town Council on Monday, the Chairman of the Sanitary Committee (Alderman Nevill Strange) called attention to the fact that during the past year there had been only 300 deaths in the borough, including deaths of visitors and deaths in the hospital and workhouse. This brought the death-rate down to 8·86, or, if they excluded non-residents, 7·6. In 1888, when the population of the town was 28,000, the deaths were only one or two short of 400. Now the population was 43,000. Improved sanitary appliances and regulations had greatly conduced to the health of the borough.

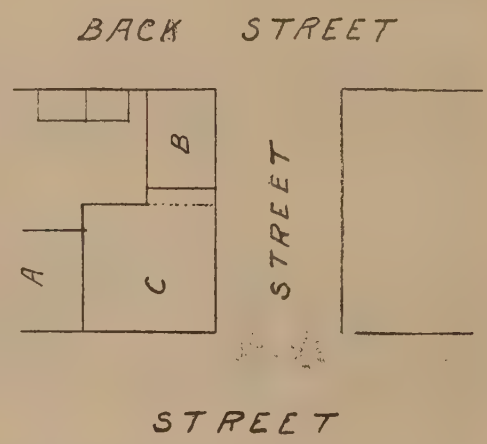
Notes and Queries.

[Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C 1

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

921.—BUILDING BYE-LAWS: NEW BUILDING AT CORNER OF TWO STREETS.—"J. E." writes:—"I submit plan showing properties A, B, and C. It is proposed to erect a cottage and shop on C, part of which site is at present covered with an old cottage, which will be pulled down. There is one privy for the three cottages. The yard shown is common to A and C. There is a covered passage between C and B, as shown. It would be impossible to get 10ft. of space, extending laterally throughout the entire width of the building, without taking it from cottage B. What is meant by width in the last paragraph? What is usually done in such cases of corner buildings? I enclose a copy of the bye-laws in force."

Answer.—The bye-laws of this Council require a space of not less than 150 square feet at the rear of a new domestic building, such space to belong *exclusively* to such building, and to be free from any erection above the level of the ground, except a water-closet, earth-closet, or



privy and ashpit. Such space is to extend laterally throughout the entire width (that is, from party wall to party wall, or where there is no party wall, to the outside gable wall or walls), and is not to be less in any case than 10ft. If there cannot be provided an open space exclusively belonging to the proposed new domestic building, such space to have a depth of not less than 10ft. and a width equal to the whole width of the building, the proposed building cannot be erected in conformity with the existing bye-laws of the Council. In the building bye-laws of some Local Authorities, a proviso is often made for dealing with the re-erection of buildings on sites where two streets meet at right angles, and a modification of the bye-law as to open space at rear is provided for, it being accepted that the two streets afford the necessary means for securing the required cross ventilation of the buildings. In such a case, however, a sufficient space to the rear should be secured for the purposes of a closet and ashpit, and it is also essential that the proviso

should be limited to cases in which there is a passage leading from the space at the rear into one of the adjacent streets. Additional information on this subject may be obtained from Knight's "Annotated Model Bye-laws of the Local Government Board," 5th edition, price 12s. 6d., which should be in the hands of all surveyors whose duty it is to interpret and see to the execution of such bye-laws. A Local Authority are not enabled to enforce the provision of a separate water-closet or privy for every individual house built or rebuilt. Sec. 35 of the Public Health Act, 1875, which governs the case, provides that it shall not be lawful newly to build or rebuild any house without a sufficient water-closet, &c., but it does not require a separate water-closet for every individual house build or rebuilt. If the Authority are of opinion that one water-closet will be sufficient for three houses they may approve the plans, but if they deem the provision insufficient they must proceed under Sec. 36 of the Public Health Act, 1875.

922.—Steam: Latent Power of: Books Recommended.—"P. M." writes:—"What is the latent heat of steam? How many units?"

Answer.—The latent heat of steam at atmospheric pressure is 966·6 units. In other words, it requires 966·6 British thermal units of heat to convert 1 lb. of water at 212 deg. Fah. into steam at the same temperature, or 1 lb. of steam at 212 deg. Fah. gives out 965·6 units of heat in being condensed into water at the same temperature. By latent heat is meant the quantity of heat which must be communicated to a body in a given state in order to convert it into another state without changing its temperature. Engineering students who require an elementary manual on this subject should procure Ripper's "Steam," in Longman's Elementary Science Manuals, which is one of the most lucid manuals on steam of which we are aware. A more advanced book is Jamieson's "Text-book on Steam and Steam Engines," price 7s. 6d. (C. Griffin and Co., Ltd.), which is also an excellent book.

923.—Canal Boats Acts: Cubic Space to be Provided in Cabins.—"M. P." writes:—"What is the maximum number of adults and children which should be allowed to live in the cabins of canal boats containing respectively 80 cubic feet and 180 cubic feet?"

Answer.—By the General Order of the Local Government Board, dated March 20th, 1878, made under the provisions of Secs. 2 and 9 of the Canal Boats Act, 1877, it is required by Clause 8 that, subject to the conditions prescribed with respect to the separation of the sexes, the number of persons who may be allowed to dwell in a canal boat registered as a dwelling in conformity with the conditions of the Act as to registration, shall be such that in the cabin or cabins there shall not be less than 60 cubic feet of free air space for each person above the age of twelve years, and not less than 40 cubic feet of free air space for each child under the age of twelve years. Provided that in the case of a boat built prior to June 30th, 1878, the free air space for each child under twelve years shall be deemed sufficient if it is not less than 30 cubic feet; and provided also that in the case of a boat registered as a "fly" boat, and worked by shifts by four persons above the age of twelve years, there shall not be less than 180 cubic feet of air space in any cabin occupied as a sleeping-place by any two of such persons at one and the same time. From this it will, therefore, be seen that in a cabin containing 80 cubic feet of free air space, one person only above the age of twelve years, or two persons under this age, should be allowed to sleep therein, and that in a cabin containing 180 cubic feet of free air space there should not be allowed more than three persons above the age of twelve years. If, however, the boat be used as a "fly" boat, the cabin will provide sleeping accommodation for four persons, but it must not be occupied as a sleeping-place by more than two persons at one and the same time. The cabin may also be lawfully occupied by two adults and one male under fourteen, or one female under twelve years of age. Taylor's "Sanitary Inspector's Handbook," price 5s., contains much information on the Canal Boats Acts, which would be useful to our correspondent.

924.—Self-Cleansing Velocity in Sewers and Drains.—"M. P." writes:—"At what speed ought the sewage to flow in a 4in. drain to render it self-cleansing, and also in a 15in. drain?"

Answer.—In order to prevent deposit in sewers and drains below 9in. in diameter, and so that they shall therefore be self-cleansing, a velocity of not less than 3ft. per second should be produced when running full or half-full, and sewers from 12in. to 24in. in diameter should have a velocity of not less than 2½ft. per second. Inasmuch, however, as it is impossible to provide for drains or sewers always running full, and as, with a reduced depth of sewage, there is greater friction and a retardation of the velocity, allowance must be made for such, and a greater fall must be given to sewers and drains in practice than that which gives a velocity of 3ft. or 2½ft. per second, as the case may be. A safe rule to adopt is that known as Maguire's, or the decimal rule, for gradients to produce a self-cleansing velocity, which is, for

4in. drains, a fall of 1 in 40,
6in. drains, a fall of 1 in 60,
9in. drains, a fall of 1 in 90,
12in. drains, a fall of 1 in 120.

Spinks' "House Drainage Manual," price 5s., will be found helpful on the subject.

925.—Provisional Orders: Definition and Scope of.—"Surveyor" writes:—"Will you be good enough to explain what is a Provisional Order, and for what purpose may Provisional Orders be obtained?"

Answer.—Probably the best definition of a Provisional Order is that given by the Master of the Rolls in the case of Morley *in re* 32 L. T. (N. S.) 524, referring to a Provisional Order made by the Board of Trade, as follows:—"The Legislature, instead of allowing proceedings to be taken before a Committee of either House, decided that these inquiries (*i.e*, preliminary to the making of the Order) might be prosecuted more cheaply and more beneficially before a local tribunal or persons appointed to inquire into the matters locally. These proceedings are instituted, and the parties interested, instead of applying to Parliament, apply to the Board of Trade, and after making a proper investigation in the locality, the Board of Trade makes a Provisional Order, and then, if Parliament thinks fit, that Provisional Order, generally with a great many more, is confirmed by an Act, which is not procured at all by the applicants, but by the Board of Trade, that is, by the executive Government of the country. The result is that there has been an entire change of system, and all that the applicant obtains is the Provisional Order, and there is no proceeding in Parliament with which he really has anything to do *directly*.

The Board can exercise their discretion as to submitting the Order to Parliament at all, and consequently as to when they will do so. They generally group together several Orders in one Bill, in such a manner as to prevent, as far as practicable, unopposed Orders from being delayed by the companionship of such as may be contested. They can choose in which House to bring in the Bill, and accordingly at the latter part of the session they frequently introduce it in the House of Lords.

As most Provisional Orders are made for the benefit of some particular locality, and are not framed by the Local Government Board spontaneously, if opposition be made to the Order, its defence before the Committee is left to the promoters of the proposition contained in the Order, notwithstanding the observations of the Master of the Rolls cited above.

The Local Goverment Board issue a circular about the end of August every year, in which days are prescribed, usually about the 15th of December, for the sending in of applications for Provisional Orders to them.

Power to make Provisional Orders.—The Local Government Board have power to make Provisional Orders with regard to the following subjects :—

Artisans' and labourers' dwellings *i.e.*, for the confirmation of any improvement scheme of a Local Authority under the Artisans' and Labourers' Dwellings Improvements Act, 1875, Sec. 6.

Compulsory purchase of lands, *i.e.*, for empowering a Local Authority to put in force the powers of the Lands Clauses Consolidation Acts with respect to the purchase of lands otherwise than by agreement, under the Public Health Act, 1875, Sec. 176.

Confirming Acts, *i.e.*, for repealing, altering, or amending any Act by which a Provisional Order has been confirmed, Sec. 297.

Expenses, *i.e.*, for enabling an Urban Sanitary Authority whose expenses were payable at the time of the passing of the Public Health Act, 1875, otherwise than in the manner provided by the Local Government Acts, to defray their expenses out of a district fund and general district rate, levied under the Public Health Act, 1875, Sec. 208.

Gas, *i.e.*, for enabling an Urban Sanitary Authority and a Rural Sanitary Authority invested with urban powers, to supply their district with gas, under the Public Health Act, 1875, Sec. 161, and the Gas and Waterworks Facilities Act, 1870, Sec. 4.

General district rates, *i.e.*, for dealing with exemptions of property from assessment to general district rates, under the Public Health Act, 1875, Sec. 211.

Improvement Act districts, *i.e.*, for the dissolution of any such district within a borough, and the transfer of the jurisdiction and powers of the Improvement Commissioners to the Council of the borough, Sec. 270.

Joint Sewerage Boards, *i.e.*, for dissolving the district of such a Board, or for constituting such a district a united district subject to the jurisdiction of a joint Board, in manner provided by the Public Health Act, 1875, Sec. 323.

Local Acts, *i.e.*, for repealing, altering, or amending any local Act other than an Act for the conservancy of rivers in force in the district of any Local Authority, and which does not confer powers or privileges on any persons or person for their or his own pecuniary benefit, and which relates to the same subject matters as the Public Health Act, 1875, Sec. 303.

Local government districts, *i.e.*, for constituting a local government district and dividing the same into wards, Sec. 271; for dividing such a district already constituted into wards, or for abolishing or altering the wards into which such a district has been divided by a Provisional Order, *ib.*, Schedule II., Part I., r. 6; for dissolving or altering such a district, Sec. 270.

Main sewerage districts, *i.e.*, for dissolving such a district constituted under the Public Health Act, 1848, or for constituting such a district a united district subject to the jurisdiction of a joint board, in manner provided by the Public Health Act, 1875, Sec. 323.

Orders in Council, *i.e.*, for repealing, altering, or amending any Order in Council, made in pursuance of any of the Sanitary Acts, Sec. 297.

Port Sanitary Authorities, *i.e.*, for constituting such Authorities, Sec. 287.

Special drainage districts, *i.e.*, for dissolving any such district, and merging it in the parish or parishes in which it is situated, Sec. 270.

Transfer of powers, &c., *i.e.*, for settling any doubt or difference, and adjusting any accounts arising out of or incidental to any powers, rights, duties, capacities, liabilities, obligations, and property, or any of them, at any time transferred, or alleged or claimed to be transferred in pursuance of the Public Health Act, 1875, or any Provisional Order made thereunder, from or to any Authority or arising out of or incidental to the transfer thereof. Sec. 304.

Union of districts, *i.e.*, for forming any urban or rural districts, or contributory places in any rural districts, into a united district for (1) the procuring a common supply of water, (2) the making a main sewer or carrying into effect a system of sewerage for the use of all such districts or contributory places, or (3) for any other purposes of the Public Health Act, 1875, Sec. 279.

With respect to Provisional Orders authorised to be made by the Local Government Board under the Public Health Act, 1875, Sec. 297 of that Act provides :—

(1) The Local Government Board shall not make any Provisional Order under this Act unless public notice of the purport of the proposed Order has been previously given by advertisement in two successive weeks in some local newspaper circulating in the district to which such Provisional Order relates.

(2) Before making any such Provisional Order, the Local Government Board shall consider any objections which shall be made thereto by any persons affected thereby, and in cases where the subject matter is one to which a local matter is applicable, shall cause to be made a local inquiry, of which public notice shall be given in manner aforesaid, and at which all persons interested shall be permitted to attend and make objections.

(3) The Local Government Board may submit to Parliament for confirmation any Provisional Order made by it in pursuance of this Act, but any such Order shall be of no force whatever unless and until it is confirmed by Parliament.

(4) If while the Bill confirming any such Order is pending in either House of Parliament, a petition is presented against any Order comprised therein, the Bill, so far as it relates to such order, may be referred to a Select Committee, and the petitioner shall be allowed to appear and oppose, as in the case of private Bills.

(5) Any Act confirming any Provisional Order made in pursuance of the Sanitary Acts, or of this Act, and any Order in Council made in pursuance of any of the Sanitary Acts, may be repealed, altered, or amended by any Provisional Order made by the Local Government Board and confirmed by Parliament :

(6) The Local Government Board may revoke, either wholly or partially, any Provisional Order made by them before the same is confirmed by Parliament, but such revocation shall not be made whilst the Bill confirming the Order is pending in either House of Parliament.

(7) The making of a Provisional Order shall be *primâ facie* evidence that all the requirements of this Act in respect of proceedings required to be taken previously to the making of such Provisional Order have been complied with.

(8) Every Act confirming any such Provisional Order shall be deemed to be a public general Act.

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The dates given below are the latest up to which tenders can be received.

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LIMERICK.—January 11th.—Water-closet, &c.—Mr. Wm. E. Corbett, C.E., city surveyor, 28, Glentworth-street.

LONDON, N.—January 11th.—Sewer.—Mr. C. G. Lawson, Surveyor to the Southgate Urban District Council.

KINGSTON-UPON-THAMES. — January 12th. — Sewer. —The Borough Surveyor, Clatteen House.

PAINSWICK (NEAR STROUD). — January 12th.—Removal of Refuse.—Mr. Fredk. Winterbotham, clerk to the Rural District Council, John-street, Stroud.

NOTTINGHAM.—January 13th.—Lighting Requisites. —Mr. Rhodes, lighting inspector, St. John's-street.

HAYES (MIDDLESEX).—January 13th.—Sewer.—Mr. Bertram Freeman, 24, New Windsor-street, Uxbridge.

SHERBURN (DURHAM).—January 14th.—Sewer, &c. —Mr. George Gregson, Surveyor to the Council, 43, Western Hill, Durham.

STANLEY (DURHAM).—January 14th-17th.—Sewer.— Mr. Jos. Routledge, surveyor, Council Offices.

NEWMARKET.—January 19th.—Sewer, &c.—Mr. T. W. Metcalf, Town Hall, Newmarket.

Vacancies.

BOROUGH SURVEYOR (STOCKTON-ON-TEES, January 20th).—For the Corporation. Salary, £350 per annum. Mr. Mat. B. Dodds, town clerk, Stockton-on-Tees.

CITY ENGINEER (LIVERPOOL, January 18th).—For the Council. Salary will commence at £1000 per annum. Town Clerk, Municipal Offices, Dale-street, Liverpool.

ENGINEER (NEWTON ABBOT, January 11th).—For the Guardians of Newton Abbot Union. Salary, 30s. per week, subject to the deductions under the Poor Law Officers' Superannuation Act, 1896. Mr. John Alsop, clerk, Union Offices, Newton Abbot.

ROADS INSPECTOR (LONDON, N., January 15th).— For the Works Committee of the Vestry of St. Mary, Islington. Salary to commence at 50s. per week, rising by two annual increments of 5s. per week to a maximum of £3 per week. Mr. Wm. F. Dewey, vestry clerk, Vestry Hall, Upper-street, N.

WATER ENGINEER (GUILDFORD, January 12th).— For the Town Council. The salary will be 40s. per week, with the use of a house free of rent and taxes. Mr. Ferdinand Smallpeice, town clerk, 138, High-street, Guildford.

COMPETITIONS.

BELPER, January 8th.—Water Supply Schemes.—The Belper Rural District Council offers premiums of 15 guineas and 5 guineas for the two best sets of plans and reports for Crich water supply. Plans and reports to be sent to Mr. Joseph Pym, clerk, Belper. Further information may be obtained on application to the Clerk.

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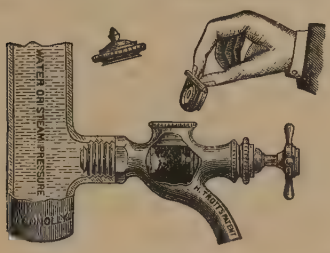

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JANUARY 14, 1898.

SMALL-POX AND VACCINATION IN GERMANY.

THE phenomenon of a people numbering over fifty millions, surrounded on three sides by others among whom small-pox is always rife, and yet enjoying an immunity unparalleled in any other country, is one which merits the serious attention of all who are interested in the vaccination question, and indeed in the study of public health. The last official reports on the practice of vaccination, and on the incidence of small-pox, issued by the medical statistical department of the Imperial Board of Health at Berlin, relating to the year 1895, are unusually instructive, bringing out clearly alike the strength and the one weak point of the German system, which dates from the law of 1874. But before discussing the figures it will be well to trace the history of the existing administration to its origin, and to explain the reasons which prompted the enactment of the legislation that has proved such a blessing to the nation. Prior to the Franco-German war of 1870—1, infant vaccination was very general in Germany, as in Great Britain; but the practice there differed very little, if at all, from that in this country, except in the fact that all men who had attained the age of twenty during the preceding twelve months had to present themselves to the military authorities, and those who were accepted, forming from a fourth to a third of the whole number, had to be vaccinated or re-vaccinated before serving their three years in the army. During the war small-pox, breaking out among the Breton recruits, spread throughout the French army, and when the garrisons of Metz, Strassburg, and Sedan, together counting nearly half a million, were carried off as prisoners and quartered in all the principal towns of Germany, the disease spread to the civil population, attacking all ages and both sexes, the German troops and "veterans," or men who had previously passed through the army, however escaping almost entirely. Of the French prisoners over 23,000 died, but of the German army in the field and at home only 226. French refugees sowed in England the seeds of the worst epidemic that had visited this country since the thirties, and the mortality from the same cause was even heavier in Holland. But while Germany suffered severely, more so indeed than this country, it was noticed that in Frankfort-on-Main, where 10,000 French prisoners were quartered, the townsmen escaped almost entirely. What could be the cause? In what respect did the citizens of that ancient Imperial and free city differ from those of other towns? The answer was clear. For forty-five years no child had been permitted to leave school without being re-vaccinated, except when exempted on a medical certificate of unfitness. One of the first Acts passed by the Imperial Parliament in 1874 was to extend to the entire empire the law that had produced such results in Frankfort, and though persons born before 1860 did not come under its operation, the effects of the change were soon manifested. For two or three years, it is true, there was but little small-pox in any of those countries in which the epidemic of 1870—3 had well nigh exhausted the susceptible material, but after that epidemics recurred everywhere except in Germany. While Vienna counted 999 and Prague 637 deaths in a single year, Hamburg and Berlin, Munich and Dresden showed but five or six, and for the last five-and-twenty years small-pox in Germany has been a vanishing quantity, the few cases that do occur being always imported from abroad, while the cases have belonged to the three classes of foreigners—Germans born before 1860, who have contracted the infection from these, or in visits to Russia or France; and unvaccinated children, of whom, owing to the fact that vaccination need not be performed before the end of the year following that in which the infant

was born, there are always over 1½ million. This is the one weak point in the system. The importation will in future be greatly checked by a regulation recently enacted in Prussia, Saxony, and one or two other States, requiring all foreigners from countries where re-vaccination is not compulsory, to submit to vaccination as a condition of domicile, employment, or continued residence in the country, unless they have already had small-pox, or can produce evidence of having been successfully re-vaccinated within the ten years preceding their arrival.

The influence of the neglect of vaccination abroad is seen in the distribution of the disease. Thus, of the 1164 deaths recorded in the last ten years, 919, or four-fifths, have been within a few miles of the frontiers or from the seaports of the North Coast, with a constant floating population of seamen from all nations. Of these 919, the maritime towns furnished 100, the south and west frontier 55, and the east and south-east 764, Russia being the main source of small-pox in Germany, and many outbreaks of the disease in the interior, as that at Berlin in 1895, being no less directly derived from intercourse with abroad. The latest complete and corrected returns are those for 1895, which show a total mortality of 27, against 88 in 1894, and 116 on an average of ten years. Five deaths occurred in Berlin, four in the district of Rybruk, and the remaining 18 were distributed mostly singly among sixteen places. Fourteen deaths were actually on the frontiers, and the five in Berlin, if not others, arose from an infection imported direct from Russia.

Prussia, with its enormous foreign trade and extensive frontiers, naturally suffers most, only fifteen cases having occurred in the other States, with an aggregate population of over 20 millions.

Of the 27 deaths 11 were of infants under two years, and all unvaccinated, seven of children under ten years (three being unvaccinated and four showing no marks), two only were adults under forty years, and one of these contracted the disease while travelling in Russia, and seven were considerably older. Of these one had been re-vaccinated over forty years previously, one had been vaccinated as an infant, fifty years ago, while nothing could be learnt as to the others. The Berlin outbreak originated with an adult man who had returned but a few days previously from a business visit to Russia, and involved altogether ten adults and six infants. Of the former who had been vaccinated or re-vaccinated, all had the disease in a very mild form, and recovered, while of the latter, all unvaccinated, five died, constituting the entire mortality in that city for at least two years. Turning now to vaccination, we find that of 1,677,321 infants born in the preceding year, giving a birth-rate of 33·5 per mile, 1,186,674 were presented for vaccination, and 201,975 = 12 per cent. escaped, with or without medical certificates, and of the possible 1,391,019 liable to re-vaccination 1,143,021 were presented, and only 36,054 = 3·15 per cent. were withheld, the deficit in each sum representing the numbers that had died in the interim.

The percentages of successes in primary vaccinations varied between 99·68 in the province of Schwabe and 92·03 in Lübeck, and of re-vaccinations between 99·63 in the Black Forest and 57·82 in Hamburg. The extraordinary proportion of failures in this city does not reflect on the skill of the operators, but is owing to the far greater permanence of the immunity conferred by the variolo-vaccine produced by L. Voigt in 1881, and, whether passed from arm to arm or for re-inoculation of calves, since used almost exclusively in public and private practice. Nowhere else have the successes ever fallen so low as 90 per cent. when other lymph has been employed.

Eleven deaths were ascribed to vaccination. Of three no information could be obtained; in seven the first signs of inflammation did not appear until the third or fourth week, and were therefore evidently due to some local infection from insanitary surroundings long subsequently to the operation, and in the single case in which the symptoms followed soon after the vaccination the infant's arm had been bandaged by the ignorant parents with a filthy rag (*stark ekelige Lumpe*). Yet in cases—of which, however, there were none in that year—when the inflammary symptoms, or even erysipelas, clearly date from the operation, the poison may, as Dr. Kübler remarks, be derived not from the lymph or the instruments, but from the infant's skin, if that has not been cleansed and sterilised as before other surgical operations. E. W.

Notes.

In the death of Mr. Ernest Hart a singularly active and useful career has been brought to a close. For over thirty years editor of the *British Medical Journal*, a post which he held till his death, he was also associated with other departments of medical journalism, and in this field he was an acknowledged power. But to our readers he will probably be best remembered by the pioneer work which he did for sanitary science, in days when the great movement which has distinguished the second half of this century was but in its infancy, and for his services in this direction his memory will long be cherished. He was chairman of the National Health Society, and of the Smoke Abatement Committee. He succeeded in placing on a satisfactory footing the arrangements for the sick poor in our workhouses, which were formerly notoriously defective; he established societies for the protection of infant life, and took an active share in the framing of the Public Health Acts; he did most valuable work in safeguarding the milk supply of towns; and last, but not least, as editor of the Sanitary Record he was instrumental in spreading the principles of hygiene through every corner of the land. Such a record, which only covers a fraction of the work with which Mr. Hart's name is identified, may well entitle him to the distinction of having been a most useful public servant and a benefactor to his age.

According to the *British Medical Journal*, the new Scotch Public Health Act, which came into operation on the first of this month, places Scotland "distinctly in advance of England in respect of sanitary legislation," but the writer qualifies this statement by the addition that its tendency in several respects is certainly reactionary. The subject is too wide to be enlarged upon in this place, nor have we space in these "Notes" to criticise

as a whole what is now established as the Code of Public Health for Scotland, most of the leading provisions of which, indeed, have from time to time been commented on in these columns during the passage of the measure through Parliament. We note with satisfaction, however, that whatever may be the defects and shortcomings of the Act, Local Authorities in Scotland have begun the new year with laudable resolutions to make the most of it, and to use their new powers to the best advantage for improving the sanitary conditions of their respective districts. They have plenty of work cut out for them to commence with—in framing new bye-laws, in bringing their existing administration into line with the requirements of the new law, and generally in making themselves thoroughly acquainted with all its numerous provisions.

At the meeting of the Educational Institute in Scotland last week a valuable paper on "Health Conditions in Schools" was contributed by Dr. Munro, Medical Officer of Health for Renfrewshire. The writer pointed out that among the larger public elementary schools at least the sanitary conditions had during the last dozen years or so undergone an enormous improvement, though not without a good deal of carping criticism from those ratepayers who view all such improvements in the light of unnecessary extravagance on the part of School Boards. The degree of perfection to which the sanitary arrangements in the principal schools of the larger towns have been carried is a striking illustration of the enlightened spirit in which most School Boards have regarded their responsibilities. But, unfortunately, this tribute of praise must end there. In the smaller schools, and especially in the older ones, the health conditions are still far from what they ought to be. Even allowing for the impossibility of expecting the latest appliances for mechanical ventilation in such buildings, a certain standard of ventilation and cleanliness ought, in the interests of the health of the children, to be maintained; and Dr. Munro gave it as the result of his experience, based on personal inspection over a wide area, that a very large number of schools in the country fell far short of observing such a standard.

It is a matter for some surprise that the Education Department, usually so rigid in their requirements, should view with such tolerance many instances of the most flagrant disregard of the elementary principles of hygiene. But, so far as the schools in Scotland are concerned, we may now expect the dawn of a better era. By the new Public Health Act schools are for the first time specifically brought within the purview of the Local Authority, and there is reason to hope that there will be co-operation between the educational bodies and Sanitary Authorities in establishing a sounder *régime*. It will be in future the duty of Local Authorities to insist upon the proper ventilation and cleaning of all schools under their jurisdiction, and the Act also confers upon them powers in relation to infectious diseases in schools. The problems to be solved are not to be minimised; there are many undoubted difficulties to contend with, but with wise administration and harmonious working we may hope that the smaller schools throughout the country will be brought up to the same sanitary standard that has already been attained in the larger ones.

We observe that the Education Department have resolved to arrange for the examination of candidates for diplomas in cookery. The examinations, which will be held at each recognised training school three times a year, will include, besides practical work, the chemistry of food, adult demonstration, and children's class teaching. This departure will give widespread satisfaction to all who are interested in health in the home; for, among the working classes especially, there is nothing that makes more surely for this end than a sound knowledge of the laws which underlie the preparation of food. Thorough practical teaching is what is required, but to those who would seek to impart it a knowledge of fundamental principles is absolutely essential. The regrettable thing, however, is that, though teachers are not slow to appreciate the advantages of this knowledge, the same cannot be said of those for whom the teaching is really intended; and girls who will one day be wives and mothers often show greater preference for more showy accomplishments than for the art of cookery, probably the most useful of all.

After 230 years of most useful work the City Commission of Sewers has ceased to exist, having now been absorbed in the Court of Common Council. It was pointed out by the chairman at their last meeting, as a somewhat curious coincidence, that the Commission was brought into existence after the Great Fire of 1666, and had to devote its last hours to the consideration of the measures required in connection with the recent disastrous fire in the city, which is considered to have been the greatest fire that has occurred since that historical conflagration. When London had to be rebuilt, on lines that would render such visitations as the plague practically impossible for the future, part of the machinery that was established by Parliament for this great work was the Commission of Sewers, created in 1667, and ever since that date it has pursued the even tenor of its way, until now it has demitted office full of years and honour. The multifarious duties of the Commission in modern times are most inadequately indicated by its rather unsavoury title, for it has not merely had charge of the sewers and the draining and cleansing of the thoroughfares, but it has also been concerned with the lighting and improvement and the general sanitation of the city, as well as many other matters, such as underground locomotion and telephonic communication.

Speaking of "multifarious duties," Mr. Chaplin in his speech at Lincoln the other day, on the work of the Local Government Board, made out a pretty strong representation of the extraordinary number of details of which that hard-working Department is supposed to be cognisant. The mere catalogue of the matters that come under its consideration is apt to bewilder the ordinary mind. The administration of the Public Health Acts, which are sufficiently complex, one would think, to engage the attention of a Department of State by themselves, represents the merest fraction of the work that falls to the lot of the Local Government Board. And every year, with fresh legislation, imposes new duties on the shoulders of the already overburdened

Department, so that no wonder the work at length reached such a state of congestion that reorganisation was found to be necessary. This reorganisation has been successfully carried out, but the day must come when further division of labour and specialisation will be requisite. Perhaps then we shall have a Department of Public Health!

In one of the last letters received from the late Sir Henry Havelock-Allan, written from Bombay, on December 14th last, he alludes to a flying visit he paid to Poona, the centre of the plague district, and says that it is to be regretted that in spite of the superhuman efforts directed by Lord Sandhurst to subdue the plague, it shows no material diminution there. And, again, a Reuter's telegram, dated 6th January, states that the plague returns for Bombay show 142 cases and 105 deaths during the preceding forty-eight hours. It appears, according to the telegram, that the epidemic is now following pretty closely the lines of the original outbreak, and ominous rumours are circulating that unless things improve by the time of the solar eclipse, there will be a serious exodus, and a general suspension of business. This is most disheartening to the gallant band that have been endeavouring to stay the ravages of the disease, and introduce a new sanitary *régime*. It may perhaps come to this, that, as in the case of the Great Plague of London, the drastic but purifying influence of fire may be found to be the only sure remedy. But what ruin and destitution that would occasion!

HEALTH CONDITIONS IN SCHOOL LIFE.

At the twenty-fourth congress of the Educational Institute of Scotland held at Stirling recently, a paper on "Health Conditions in School Life" was forwarded by Dr. Munro, Medical Officer of Health, Renfrewshire, who was unavoidably detained and could not be present. In his absence the paper was read by Mr. Marshall, Airth. The health conditions of our public elementary schools, Dr. Munro wrote, had in the average very markedly improved in the course of the last dozen years, at a cost which the average ratepayer—from whom, however, in this matter he was anxious to dissociate himself—was inclined to regard as extravagant. But on closer observation it would be found that the great advance to which he referred had been in great part confined to the larger schools and larger towns. Certainly in the newer schools in the large towns it would almost appear as if finality had been reached, in so far, at least, as structural health conditions were concerned. But in our smaller schools on the average health conditions left a good deal to be desired, even in the case of newer schools, while in the case of many of the older schools matters were in the highest degree unsatisfactory. This he said as the result of observation of schools over a considerable portion of Scotland and England. The type of schools to which he particularly referred was that which accommodated from 100 to 400 children. Here mechanical ventilation was out of the question, but a certain minimum in the matter of heating and ventilating and cleanliness they were entitled to demand in the interests of health. In view of what one had heard of the excessive and rigid requirements of the Education Department, he who visited the smaller schools of the country stood amazed at the tolerance with which the Department had regarded the most glaring offences against the elementary principles of hygiene. In the past the schools in their every relation had been regarded as under the sole control of the Education Department, and Sanitary Authorities, when they ventured to intervene, had done so with bated breath and humble mien. That matters were not entirely satisfactory had apparently found recognition in high quarters, for the new Public Health Act which had come into operation at the beginning of this year considerably altered the point of view, and it was, indeed, this alteration which had determined his choice of a subject. With attention anew directed to these matters, it was possible that the educational authorities might meet the Sanitary Authorities half way in the advances which these latter bodies were pretty sure presently to make to them. In the Public Health Act of 1897 schools were for the first time specifically brought within the purview of the Local Authority, and it would in future be the duty of that authority to see that the school-houses were properly ventilated and free from overcrowding, were kept in a cleanly condition, and were provided with proper sanitary conveniences. The Act also for the first time dealt with schools in relation to infectious diseases. Proceeding, he described the unhealthy conditions of an average small school of an older date, and pointed out that, even in the somewhat larger school, the result of the efforts made had not been satisfactory. It must be admitted that the problem of heating and ventilating these smaller schools was no easy one, and he offered a few suggestions on the subject. It was singular how far architects of public buildings had been from grasping the fundamental principle that in our winter climate, for efficiency, heating and ventilating must be combined. The solution of the problem in the case of any school depended upon the intelligence with which this principle was applied to the circumstances of the particular cases. In schools the ancient system of hot-water piping along the sides of the room or placed beneath the gratings ought to be disestablished. The fundamental point in any system of heating by hot water or steam, and especially in any combination of heating and ventilation, was sufficient boiler power. He asserted that children caught colds and chills through draughts produced in the effort to mitigate defective ventilation, and that many fatal illnesses resulted in that way. The most serious condition remained behind, and it arose in connection with infectious diseases. There was no doubt that at present school attendance was a dominant factor in the spread of infectious diseases; in the case of scarlet fever less distinctively, in the case of measles and whooping-cough beyond all doubt. The defective ventilation of our smaller schools might not exert a very direct appreciable influence on the health of the children, but he was perfectly satisfied that when an infective subject found entrance to a school the defective ventilation of the school played a considerable part in the spread of the disease. Fresh air was the most effective disinfectant. One other condition favourable to the spread of infectious disease was unhappily too common in our smaller schools—it might be described in gentle terms "insufficient cleanliness." He advocated the more frequent cleaning of school floors, &c., as being essential for the remedy of this evil.

NOTES ON PRACTICAL SANITARY SCIENCE.

By WILLIAM H. MAXWELL.

Assistant Engineer and Surveyor, Leyton Urban District Council, Author of "Drainage Work and Sanitary Fittings," "Ventilation, Heating, and Lighting," &c., Certificates of the Association of Municipal and County Engineers, and Sanitary Institute.

No. 43.—REFUSE DESTRUCTORS.

(Continued from page 9.)

The Borough Engineer of Salford, Mr. Jacobs, designed a furnace for dealing with town refuse and sewage sludge. Its construction was upon the lime kiln principle.[105]

Odgen, of Burnley, introduced a destructor formed with two fires and a boiler over. Among the advantages claimed for it were—the burning of offensive gases by carrying them over a coke fire, and the carbonising of refuse and retention of its fertilising properties.

Amongst the towns which took the lead in the adoption of refuse destructors may be mentioned Manchester, Birmingham, Leeds, Heckmondwike, Warrington, Blackburn, Bradford, Bury, Bolton, Hull, Nottingham, Salford, Ealing, London, and others. The "destructor" has now become very general throughout the country, and numerous furnaces of *recent type* are now either in course or at the point of erection, a destructor in large towns being regarded almost as an indispensable item in the list of municipal contrivances.

The best known destructors of the present day will now be described and illustrated.

Fryer's Destructor.

The general arrangement of the Fryer destructor was patented[106] by the late Mr. Alfred Fryer (of the firm of Manlove, Alliott, and Fryer) in 1876, and is illustrated in the accompanying figures (Nos. 5 and 6):—

This type of destructor consists of a block of cells usually arranged "back to back" in pairs, with a flat top, upon which the house refuse is tipped. Each cell measures internally about 9ft. by 5ft., and is covered by a fire-brick arch 3ft. 6in. high above the grates. The bottom of the furnaces, as will be seen from the illustrations, have an inclination of 1 in 3, from back to front; the rearmost or higher position of which, for a width of 4ft., forms a fire-brick hearth or dead plate, and the lower or remaining part, having a width of 5ft., consists of fire-bars. A wall at the back end of the cells divides each furnace into halves; on one side the upper end of the slope is carried up with a steeper slope to a "feeding hole" for the admission of refuse from above, whilst on the other side is a passage forming an opening into the main flue for the escape of the products of combustion. When the cells are placed back to back with the feed-holes adjoining, only one opening is provided

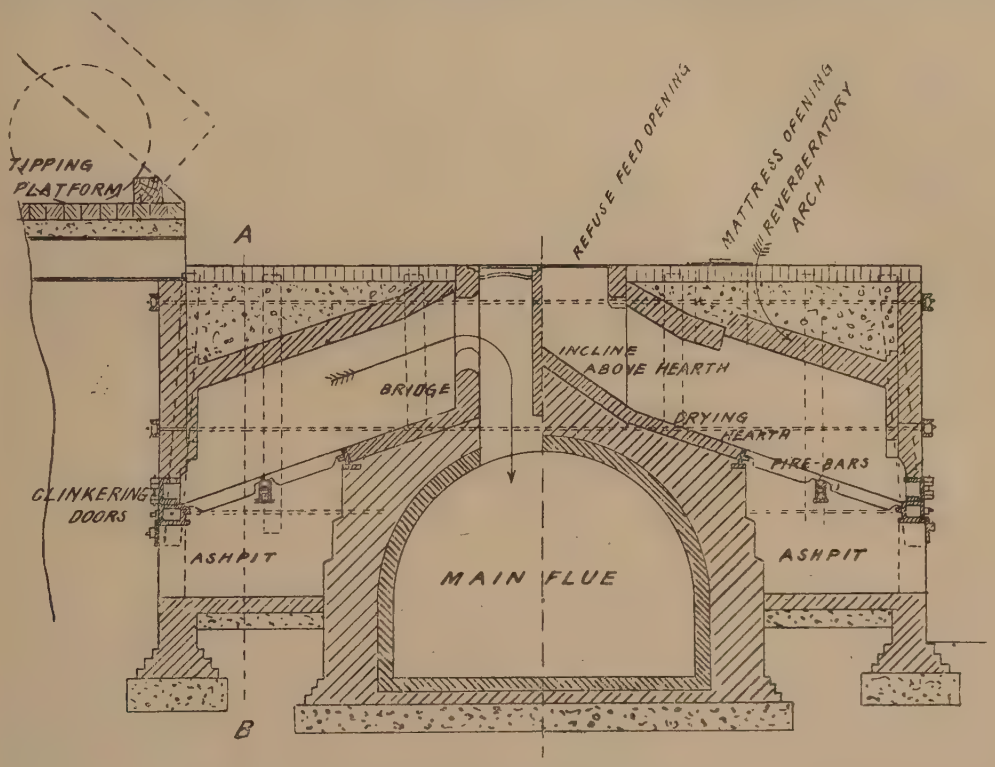


Fig. 5—Section of Fryer's Destructor

[105] "Proceedings" Association Municipal and County Engineers, vol. xiii.

[106] Patent No. 3125, A.D. 1876.

for each pair of cells. The main flue, which is of large size, also forms the dust chamber, and is underneath the hearth. Over the middle of one or more of the furnaces, another opening fitted with a cover is provided and through which infected bedding, condemned meat, &c., can be put into the hottest part of the fire. The space thus provided is not usually large enough to be well adapted for the purpose, as bulky articles—as mattresses, &c.—require to be cut up before they will pass through. The refuse in the cells is moved forwards to the fire-bars by raking from below through the fire door and pushing from above. The clinkering is done at intervals of about two hours or when thoroughly burnt. It is removed from the bars and raised through the burning cinders by means of long iron bars or clinkering tools and raked out of the furnace.

The furnaces have cast iron furnace mouths, with doors 5ft. wide, hinged at the top to open upwards with balance weights.

Both furnaces and flues are, of course, lined throughout with fire-brick.

A group of six cells with their enclosing brickwork forms a rectangular mass measuring about 21ft. by 24ft., and 12ft. high. The refuse arrives at the top of the furnaces by means of an *inclined roadway*, generally built between battering retaining walls, which leads to a platform some 2ft. 6in. above the destructor. This roadway, it need scarcely be mentioned, should be of as flat a slope as can be obtained, and in no case steeper than about 1 in 15. Upon a limited site a *lift* or *elevator* is sometimes used to raise the refuse to the top of the destructor, but a cart road is more satisfactory.

To create a good draught and to carry off all offensive fumes, &c., a destructor *chimney shaft* requires to be from 120ft. to about 200ft. in height, and the lower part is usually finished with a fire-brick lining with a 4½in. air space to a height of from 50ft. to 70ft.

"There is one feature in connection with this form of furnace which militates against its use from the nuisance point of view, and it is this, that the outlets for the products of combustion are at the back, and that, whilst a charge is burning upon the furnace bars the next charge lies upon the dead hearth at the back near the outlet flue, where it undergoes drying and partial decomposition, with the result that offensive vapours are given off, and these pass into the flue without being exposed to sufficient heat to render them inoffensive, and in some cases have produced a nuisance. A second furnace called a '*cremator*'[107] has therefore in many cases been placed in the flue leading to the chimney shaft for the purpose of resolving the organic matters present in the vapour; but the greatly increased cost consequent upon the introduction of the cremator has led to its disuse altogether in some cases."[108]

The following observations as to the general methods of *working* the Fryer destructor apply also, with slight modifications to meet special circumstances, to all destructors, and need not therefore be repeated[109]:—

"The cart, on entering the yard in which the destructor is built, is drawn by a horse up an inclined roadway with varying gradients of from 1 in 12 to 1 in 25, and on arriving at the top a platform is provided with tipping curbs, against which the carts are backed, and their contents are tipped on to the top of the cells. Here the material remains for a short time, until one of the cells is ready for a charge, the charging holes being in direct communication with the fire, but so arranged that very little smoke at any time issues from them. When a cell requires to be charged, the material is shovelled or drawn with a two-pronged rake into and on to the top of the charging hole. A second man stands in line with the opening, and as the material is delivered on to it he pushes it down the incline on to the drying hearth, and continues doing so until the hearth is completely covered. The quantity usually put on at one charge varies from one-third to one-half a cartload, or from 20 cubic feet to 30 cubic feet. From the drying hearth the material is drawn down on the bars as required by the fireman, who stands at a lower level and in front of the furnace. He first clears his fire by pulling the clinker out, spreads the burning material evenly over the fire bars, and then draws down a fresh supply of the partially-dried material from the drying hearth. He usually finishes up by running his bar through the fire, so as to leave as free a passage for the air as possible."

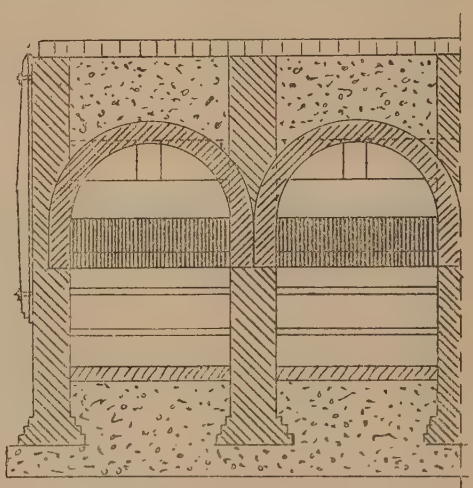


Fig. 6—Fryer's Destructor—Cross Section at A B, Fig. 5

Too much refuse should not be drawn down at once, or the fire will become dead and blackened. Thin layers may be raked down at intervals of about 20 minutes, but the fires should be undisturbed for at least half an hour before clinkering. The fire on the bars (which should always be kept covered) should not be more than about 9in. thick, which is sufficient to secure a clear fire.

"The clinker falls into a barrow provided for the purpose or upon the ground in front of the furnace, where it is cooled by having water from a hose sprinkled upon it. The fine ash drops through the bars into the dust hearth, and it is found that the material in passing through the furnace is reduced to about 25 per cent. of its weight. This residue consists partly of fine ash and partly of clinker, in varying proportions according to the

107 This apparatus will be described in detail later.

108 "Report on Dust Destructors," by the Medical Officer and Engineer (London County Council, May, 1893).

109 Pamphlet on "The Disposal of Town's Refuse," by H. Percy Boulnois, M. Inst. C.E., City Engineer, Liverpool.

character of the material which has been consumed. Whilst the combustion is proceeding, the hot gases from the furnace or cells escape over the bridge into a central flue 6ft. high by 10ft. 4in. wide. This is arranged to prevent too great a velocity from carrying pieces of paper and other unconsumed material to the chimney, and also to allow of the deposit of dust within the flue."

In connection with the Fryer furnace as installed at Ealing, Mr. C. Jones, M. Inst. C.E., has introduced an automatic means of reducing the admission of cold air into the flues, &c., during the processes of feeding and clinkering. "This is done by means of a cast iron hinged door, over the opening entering the dust chamber, attached by a chain to the furnace door, and is so arranged that when the furnace door is open the entrance to the dust chamber has about four-fifths of its area closed; and when the furnace door is shut the flue door is open. This arrangement, being entirely automatic, is quite independent of the attention of the stokers."[110] Also, to reduce the inconvenience of the blowing about of fine dust, a concave water pit is introduced under the fire-bars and into which the ash drops, from whence it is removed in a damp state.

Mr. Stevenson Macadam, Ph.D., F.I.C., &c., as a result of his observations upon this type of destructor, says,[111] there being no forced draught and the supply of air to the cells being entirely dependent upon the suction induced by the chimney shaft, the "general result of working this destructor is that the heats are not sufficient for fully dealing with the combustion of the refuse. There is a tendency for foul smelling gases to pass away unconsumed; for the cinder stage to be only a dull-red heat, and for the clinkering of the residue to be imperfect. I have seen the stuff dragged out of this destructor in an inflaming condition, and the cinder and clinker still glowing and burning, and evolving organic and sulphur gases most abundantly, rendering the atmosphere quite suffocating and nauseous, whilst the fine dust was being blown about all around and over into the neighbouring properties.

"The imperfectly burned gases leaving the Fryer cell, and going by the main flue to the chimney, are supposed to be consumed in the main flue, but unless the temperature there is a full red heat—about 1500 deg. Fah.—these gases cannot be properly burned there. As I have often seen the main flue at a black-red heat, not above 1000 deg. Fah., it was impossible that the organic gases could be rendered innocuous. The deficiency has apparently been admitted at several stations by the construction in the main flue, between the cells and the chimney, of a "*cremator*" where coke is being burned, and the gases travel over the bed of red-hot coke, and are there consumed. In this way the admittedly imperfect combustion of the refuse products in the cells is met by the use of a cremator, which requires extra labour, and involves additional cost in fuel."

STOURBRIDGE. — The Urban District Council has instructed its surveyor to prepare plans for the erection of the new baths.

110 "Refuse Destructors," by C. Jones, M. Inst. C.E. (1894.)

111 See *Journal of the Society of Chemical Industry*, March 31st, 1896, No. 3, vol. xv.

THE SANITATION OF DOMESTIC BUILDINGS.

By FRANK LATHAM, C.E., M. San. Inst., &c., Assistant Surveyor, Borough of Margate.

CHAPTER II.

SECTION I.

DRAINS are combinations of tubes or pipes, placed in convenient and practical positions, jointed together in such manner as to form water and gas-tight conduits for the purpose of conveying all waste liquids and fæcal matters from our dwellings into a sewer or other suitably constructed receptacle. With house drains the selection of pipes is the first and not the least important matter. This requires a great deal of experience, as there are many points to be observed and considered.

The pipes considered most suitable for house drainage purposes are manufactured from clay, and in the firing are glazed with salt, being known as salt-glazed stoneware pipes.

Stoneware pipes should be well baked, of hard substance, and quite straight, truly concentric in section and of equal thickness throughout, not less than one-twelfth the diameter, and thoroughly glazed both inside and outside. They should be perfectly non-porous, the inside smooth, and free from irregularities. The outside of spigot end should be slightly roughed in the making, to afford a good key to the cement, and the socket should be of sufficient depth to make a good joint, the inside of which being also roughed in the making. The pipe and socket should be made in one piece. The tested pipes manufactured by Messrs. Doulton are known as the standard of what good pipes should be.

Besides Messrs. Doulton and Co., there are other firms recognised as successful manufacturers of stoneware pipes. The Albion Clay Company, Ltd., manufacture the well-known "Granitic" stoneware pipes, which are carefully made and of first-rate quality. These pipes are extremely tough and hard to fracture, and at the same time non-absorbent. The selected pipes, which are stamped "Tested," are very satisfactory for the best class of work, besides being reasonable in cost. Messrs. Craig, Limited, is an old-established firm, and amongst their numerous fire-clay works for which high awards have been given, their glazed drain pipes have received a favourable notice for quality, good shape, and glazing. Their best selected are all that is required. Messrs. Jennings' stoneware pipes, judging from the large amount of work executed in this line by the firm all over the country with the most favourable results, is sufficient proof of the excellency of their manufacture. Messrs. Oates Green, Limited, manufacturers of the "Nalethrie" stoneware, are noted for their "Truinvert" patent pipe, and stand high for the excellency of their materials and workmanship. Messrs. Sankey and Son are the manufacturers of various descriptions of stoneware goods, and, like Messrs. Doulton, have London and country-made pipes. Their productions are invariably of a good sound and impervious nature. There are other firms in various parts of the country who stand equally as high for the excellence of their ware as the foregoing.

Where a drain passes under a house—a method which should be avoided where possible—it is de-

sirable, but not absolutely necessary, to use iron pipes jointed with lead.

A special advantage gained in the use of iron pipes for this purpose is that, being in 9ft. lengths, they only necessitate one joint in a length where stoneware would require four, besides which they are more self-carrying, and not so liable to fracture as stoneware. These pipes should be vertically cast with sockets downwards. They should be truly shaped concentric, and the thickness of metal maintained without variation throughout.

The spigot end of each pipe should be furnished with a projecting bead or fillet, which should fit into the sockets, leaving not more than $\frac{1}{16}$in. clearance all round. Iron pipes for sewage purposes of diameters of 4in., 6in., and 9in., should be 9ft. in length, excluding sockets, and $\frac{3}{8}$in. in thickness for 4in. and 6in. pipes, and $\frac{1}{2}$in. for 9in. pipes. The depth of the sockets should be $2\frac{3}{4}$in., and the weight 160 lb., 236 lb., and 560 lb. each respectively. They should stand a test of between 400ft. and 500ft. of water. The metal used in their manufacture should be free from cinder or inferior iron, and to be strong, tough, and close grained. They should be free from air holes or other imperfections of casting. Iron pipes are sometimes treated with a special process to prevent corrosion from the action of the sewage.

The process known as the Barff is useful for this purpose, and consists of covering the surfaces with a coating of magnetic oxide. It is produced by the action of superheated steam upon the metal when confined in a heated chamber, the coating of oxide being deposited on the surfaces of the pipes by the combustion of the decomposed steam and oxygen. This system has been improved upon to a great extent by a less expensive treatment, known as the Bower process, which is similar to the former, but the magnetic oxide coating is obtained in a quicker and somewhat different manner. Dr. Angus Smith's process, which is another treatment for iron pipes, for the prevention of corrosion, is by heating the pipes to a high temperature and placing them vertically into a heated liquid mixture of coal tar, pitch, resin, and linseed oil, the pipes after immersion being slowly withdrawn and placed in their same upright positions to cool. Before being subjected to this treatment they are well cleaned and freed from any cinder or rust. Having thus given a description of the pipes generally used for house drainage, the next important matter for consideration is the manner of laying them to constitute a clean and effective drain.

Drains should be laid with gradual falls in the same direction from beginning to end. Perfectly straight pipes having been selected, so that they will efficiently drain themselves dry and leave nothing in any hollows to lead to decomposition and foulness, the trench should be excavated a width convenient for working, and the floor finished to the required fall, starting from the sewer end, and should there be any soft place, or where too much has been removed, the filling in should be well consolidated, or concrete substituted for the original material. A length of pipes should be laid in their places with the spigots turned in the direction of the flow of the drain before any joints are made, but in the case of ordinary socket pipes a strand or two of tarred gasket or hemp should be tightly fastened round the end of the spigot of sufficient thickness to firmly hold the same in the socket of the next pipe, but which at the same time must not occupy much of the depth of the socket which is required for cementing. When the pipes are being so laid, small countersinkings or grips should be cut in the trench just deep enough to receive the sockets, in order that the barrels may rest firmly throughout their length on the solid floor of the trench, thus relieving the sockets from undue pressure, probably resulting in the breakage of the pipes and joints for want of uniform support in the direction of their length. It is always necessary where the pipes do not rest on the firm virgin earth to lay a bed of 6in. of Portland cement concrete throughout the length and width of the trench for the drain to rest upon. This can be done before the drain is laid, in which case, when the joints are finished, the space underneath the pipes between the sockets should be well filled up with good fine cement concrete. Sewers and drains up to as recent date as 1845 were as a rule constructed of brickwork, sometimes as circular, and sometimes as square conduits, and the workmanship and materials in connection with them were generally not of the best.

At the introduction of earthenware pipes for sewage purposes, and for some time afterwards the collars or sockets were made by a separate process and placed on them by hand until a method was introduced by which pipes and sockets were manufactured in one piece. For some time the joints were merely made with clay, which very soon washed out. Sound water-tight jointing was not considered of much moment, until its necessity was recognised. At the present time, when nothing but such joints can be permitted, Portland cement for stoneware pipes meets with general approval as an all-round good material sufficient for most cases.

The method of cementing the joints of ordinary socketed stoneware pipes is very important, and is done, in the first place by well caulking the joint underneath, between the socket and spigot, with Portland cement, previously pushing the spigot and gasket well home into the socket.

After the underneath part is filled in, the sides, and lastly the top, should be completed, and at the finish the whole should be trowelled off to a smooth surface. To make sure that any cement which may have gained access to the inside of the pipes is properly removed, a leather disc on the end of a rod, of a loose fit, should be passed through the interior to remove such intruding substance, which otherwise might obstruct the drain.

Worksworth.—At a recent District Council meeting the Medical Officer of Health laid before the members a scheme for building a new reservoir to hold 3,000,000 gallons, which would give a supply for 45 days, the cost being about £4000.

Sleaford.—The Rural District Council at a recent meeting received a letter from the Local Government Board with respect to a proposed loan for a water supply at Scredington, in the Sleaford Rural District. In this case a water diviner had been employed, who made a charge of five guineas, and the Local Government Board had previously refused to allow this amount to be included in a loan, and also £65 expenses in connection with the same. The Board now wrote that it had reconsidered the matter as far as the £65 was concerned, but could not allow the five guineas, the water diviner's fees, to be included.

SANITARY FARM BUILDINGS.

By Louis Hanks, Assoc. San. Inst.

The design and construction of farm buildings is a subject which has from time time engaged the attention and elicited the several opinions of landowners, agriculturists, and architects, with the result that a few model establishments satisfactorily embody both scientific and practical improvements. In other instances the theoretical advantages are admitted, and some limited attempt has been made to carry them into practice (too often with insufficient knowledge or means, and consequently but partial success); but in the majority of cases no attempt has been made to deal with the subject of farm or dairy sanitation.

This is the more to be regretted, as the problem is not in itself a difficult one, nor incapable of effective and economical solution, the evils most commonly met with arising chiefly from ignorance of certain natural laws and consequent neglect of simple but all-important methods and precautions.

It is an ancient but still popular fallacy that matters of sanitation are of less consequence in the case of farms and other isolated country dwellings than in towns and cities where populations are massed in close quarters; the idea being that plenty of fresh air and apparently healthful surroundings will more than neutralise any possible ill effects from dampness of site or structural defects, badly-ventilated apartments, unwholesome water supply, bad drainage, accumulations of filth, and similar dangers too widely prevalent. These erroneous views are sufficiently dangerous to the immediate dwellers amid the evils referred to, but when food products are derived from such a source, as in the case of stock and dairy farm, it becomes a matter of danger to the public health, and as such concerns both the legislator and the sanatarian.

The Dairies, Cowsheds, and Milkshops Orders of the Local Government Board, issued in 1885—86, take cognizance of the dangers to be apprehended from insanitary conditions affecting the milk and dairying industries, and prescribe certain rules and regulations. It is, however, matter for regret that inadequacy of inspection and want of machinery for enforcing these Orders has prevented them being so useful as they might have been.

It is therefore to the enlightenment of those engaged in these businesses that attention should be directed, and the force of public opinion must be exerted in insisting on dairy produce being procured, land vended under sanitary conditions, such as those to be indicated in the course of this paper. This is a matter which is not only of sanitary but of economic and national importance, the failure of profitable arable cultivation over large areas of British land having diverted farming enterprise into the direction of dairy farming and the breeding of live stock for the home markets.

The lesson suggested by these considerations is that farm management must be modified and brought into harmony with recent scientific discoveries, and with improved methods of working as practised in some other countries.

The discovery of the "germ theory of disease" has shed a flood of light on the operating causes or many disorders, whose origin and means of transmission was formerly unknown or obscure. Among other important facts in this connection is the demonstration of the inter-relation of many animal diseases and those affecting man, and of the danger to human health of contracting some communicable disease such as tuberculosis, scarlet fever, diphtheria, &c., by means of meat or milk, particularly the latter.

We have thus two powerful arguments in favour of farm sanitation, the one on economic and patriotic grounds of desire to benefit our own agriculturists by scientific aid in the direction of competing on advantageous terms with the imported produce of foreign rivals, and the vastly important other aspect of the case from the point of view of the public health. In either case the essentials of the subject are the same and may be summarised as a combination of natural forces with artificial aids by the agency of scientific knowledge and common sense. One of the most important points to be kept in mind is the question of expense of improvements. Diminished profits, if not actual loss, and falling returns from the majority of the sources of rural wealth, have so impoverished the exchequers of squire and farmer alike that little or no funds are available in numberless cases for any description of improvement. For this reason the suggestions to be made in these papers will be strictly governed by considerations of the least possible expense.

It is not by any means the most costly scheme which is universally the best or most successful.

Nature, rightly understood, will do so much that little artificial aid is needed.

The chief desiderata of a sanitary homestead are as follows:—A healthy and suitable site, dry, weather-tight, and conveniently-arranged buildings, an ample supply of pure water carefully shielded from chance of pollution, good drainage, so arranged as to promote dryness of site and the avoidance of filthy accumulations in dangerous positions; the use, as far as possible, of impervious and non-absorbent materials for walls, paving, internal fittings, and feeding vessels of those structures devoted to the use of animals, strict attention to the hygienic arrangement and management of the dairy in accordance with modern principles, and in all cases thorough cleanliness, both structural, administrative, and personal. Fresh air and light are, of course, taken for granted, as there should be no possible difficulty in securing these blessings in the case of a farm or any country dwelling.

The first points to be considered are the nature and character of the soil on which the buildings are to be erected, and whether it is effectually drained so as to be perfectly dry, for no advantages in other respects can compensate for a damp situation, both as regards health and property. A house built in a damp situation, even though the greatest care has been taken in making proper foundations, is still unwholesome, and should the materials of which it is built be of a porous or inferior quality, it will be unhealthy as a residence, the structure will decay all the more rapidily, furniture and clothing will become mouldy, and there will be constant discomfort and expense. In low, damp situations, it is well known that the air is at all times charged with a greater degree of moisture than is the case in dry, open positions. A most air suits very few constitutions, either of man or beast, and seldom fails to bring on rheumatism, lung troubles, and other maladies. It also unquestionably favours the growth and development of fungi,

(moulds, &c.), and the bacteria of such diseases as diphtheria, tuberculosis, and malaria.

Damp and water-logged situations are also responsible for much sickness and loss of life among live stock, and consequent pecuniary loss to their owners. Such diseases as bovine tuberculosis (consumption), anthrax, sheep rot, &c., are largely favoured by such conditions, and the expenditure of a few pounds on land draining would often more than repay itself, not only in improved health of the stock, but in benefit grass to land and arable alike.

In any case the immediate site of the homestead should be as dry as it is possible to get it, either by natural or artificial means, and, to avoid the necessity of recapitulation, the remarks on site, soil, and aspect of stables set forth in the first of these articles, which appeared on page 1039 of the *Field* of December 26th, 1896, may be taken as equally applicable to farm buildings where there is any option in the matter, as in the case of a new establishment. In the majority of instances, however, we are met by the difficulty of dealing with old, dirty, or inconvenient erections, which were adapted to the primitive habits and obsolete methods of bygone generations, but which have now to be brought into harmony with the urgent requirements of new conditions.

To achieve this in the cheapest manner it is necessary to keep in mind a few essentials of a modern farming establishment to be guided in any alterations by sanitary rules of construction, making use of such local labour and material as can be obtained at least expense, and to remember that nothing elaborate or architectural is called for in farm buildings where rough-and-ready expedients on proper lines will answer just as well as the most costly or intricate contrivances. Good planning, or the best arrangement of the various structures, yards, and conveniences constituting a homestead, is a matter of considerable importance, not only as regards economy of construction, but even more so with respect to health, comfort, and economy of administration. A badly-arranged house is responsible for much loss of time and temper, as well as for a large amount of unnecessary bodily fatigue; and this, which may be merely an annoyance in a domestic building, becomes a more serious matter in the case of a business establishment, such as a farm homestead of the present day, when success or failure in this industry is a good deal governed by what may appear trifles of small importance.

The loss of a few minutes in traversing a given space may be almost unnoticed in an occasional instance, but when that loss is repeated over and over again in the administration of such an establishment it means loss of money and waste of energy. For this reason the grouping of the buildings should, where possible, be so arranged that the distances to be traversed between the various departments should be as short as possible; that the cow-houses, dairy, beast sheds, piggery, henhouse, and other departments demanding constant administration be disposed in the most convenient position for access in all weathers; and that sheltered communication between the farm house or administrative centre and the departments referred to is advantageous and economical.—*Field.*

LIVERPOOL.—The sanitary arrangements of the Steble-street Baths are to be improved at a cost of £1929.

THE SAFE-GUARDING OF WATER SUPPLIES.

IN the course of a paper read to the members of the Birmingham and Midland branch of the Incorporated Society of Medical Officers of Health on "The Safe-guarding and Examination of Public Water Supplies," Dr. Bostock Hill referred to the recent epidemics at Maidstone, King's Lynn, and other places as having brought prominently to the public mind the danger arising from the pollution of water. These epidemics, he said, had caused the public to become alarmed at a danger which had hardly been thought to exist. Hitherto it was thought that the danger was principally due to private supplies from surface wells, and efforts had been made chiefly to do away with these and substitute for them public supplies supposed to be above suspicion. It was, therefore, hardly surprising that the tracing of the recent outbreaks to the public water supplies had produced something like a shock in the public mind, and called attention to the necessity for special efforts to be taken to safeguard public supplies. Public water supplies were obtained generally from streams, springs, moorland, and deep wells, and these might obviously be polluted from various causes and in different ways. In the case of springs, it was easy to get pollution on the gathering ground or at the point of collection, and it was obvious that it was very important for the gathering ground to be protected from the danger of surface pollution. In the case of deep wells, unless there was negligence, it was not easy at first to see how pollution could occur, providing the water was not originally polluted. Some water engineers at the present day took a stand against well water because its capabilities of minimising pollution were not great. It was, however, more important that the public supply should be above suspicion than that it should have a problematical power of minimising pollution. When a supply was obtained from upland surfaces, it was essential that measures should be taken to see that no source of pollution, particularly human pollution, remained, while animal pollution should be reduced to a minimum, and manuring for agricultural purposes prohibited. The great question of the present time was the fitness of river water for public supplies. Though a Royal Commission had approved of the London supply from the Thames, there was no reason why the conclusion of that body should be regarded as accurate or final. If a river received but a small amount of sewage, there was little doubt but that the purifying powers of nature would render it reasonably safe, if used for a public supply considerably lower down, but he questioned whether that was a condition often found existing. Oxidation, sedimentation, storage, and filtration could be shown to effect a wonderful amount of purification, but methods of purification depending on human effort were known to fail. It was not out of place, also, to consider the matter from the point of view of æsthetics, for nothing more nasty could be conceived than the use for potable purposes of water which was known to have received sewage. He asked whether the time had not arrived when from that point of view alone such water should be discarded as being unfit for drinking purposes. The sewage problem had also to be considered, for sewage effluent could not be abso-

lutely purified, and it was impossible to prevent the effluent gaining access to the rivers. On that ground alone it seemed to him that the supply of large inland communities from rivers must always be open to danger of a grave type. As to the methods for examining water, Dr. Hill insisted that, first of all, the most direct inspection of gathering grounds by competent inspectors was necessary, and that Medical Officers should have the power of entry to all waterworks and gathering grounds. On the subject of analysis there was a tendency, said Dr. Hill, to decry chemical in favour of bacteriological examination. For his own part he enforced the necessity of the use of all means of analysis, chemical, microscopical, and bacteriological, if the examination was to be completely successful.

PUBLIC HEALTH PROGRESS IN THE QUEEN'S REIGN (1837—1897).*

By T. RIDLEY BAILEY, M.D., of Bilston.

(*Continued from page* 14.)

SMALL-POX AND VACCINATION.

The fascinating story of the life of Jenner and the discovery of vaccination has been recently retold in connection with the Jenner centenary, and the report of the Royal Commission has drawn further attention to the subject. On the 14th of May, 1796, Jenner performed his first vaccinations on the human subject, but it was not until 1840 that the first Vaccination Act was passed by which every person could claim to be vaccinated at the public cost. In 1853 the operation was made compulsory on all infants above three months old. Only in 1871 were Boards of Guardians compelled to appoint Public Vaccinators. "Vaccination duly and efficiently performed," says Jenner, "will protect the constitution from subsequent attacks of small-pox as much as the disease itself will. I never expected that it would do more, and it will not, I believe, do less." That vaccination affords protection from small-pox, and that the prevalence of the mortality from the disease has in consequence marvellously decreased, admits of no reasonable doubt. The diminution of small-pox is well stated by Sir R. Thorne-Thorne:—"During the period 1838—42, towards the end of which the advantages of the Act of 1840 were in operation, the rate of mortality from small-pox in England and Wales was 57·2 per 100,000 living, by the end of 1849 it had fallen to 29·7, and during the period 1850—54 to 27·4. It was at this time that the Vaccination Act of 1853 came into operation. The Act embodied the principle of making vaccination compulsory on all infants within a few months of birth—a new departure which had so largely contributed to the prevention of death from a loathsome disease. During the course of the next three quinquennial periods the small-pox rate fell further to 19·8, 19·0, and 14·4 per 100,000 respectively, the latter portion of the last period, viz., that for 1865—9, being in part influenced by the operation of the provisions embodied in the comprehensive Act of 1867." In the epidemic of 1870—72, however, the mortality increased largely, the rate for the five years 1870—74 rising to 42·7 per 100,000, and though this again decreased to 8·3 in the years 1875—79, and to 6·5 for 1880—84, it was obvious that the subject had not been fully understood, and that there were other considerations requiring recognition. It was found that a large proportion of the deaths in the epidemic of 1870—72 occurred in persons over fifteen years of age who had been insufficiently vaccinated in infancy, and as a result of the most careful investigation, it is now known (1) that the lymph to be used must be carefully selected, (2) that the operation must be of a recognised minimum standard, (3) that the protection is frequently limited to a term of years, (4) that consequently re-vaccination is necessary about the period of puberty, and (5) that even when an insufficient vaccination does not give complete immunity it greatly reduces the virulence and fatality of the disease. This is clearly proved by Mr. Marson's experience at the Small-pox Hospital during twenty years. He states that of persons admitted with small-pox—

	Number admitted.	Mortality per cent.
1. Having one vaccine cicatrix ..	2,001	.. 7·73
2. Having two vaccine cicatrices	1,446	.. 4·70
3. Having three vaccine cicatrices	518	.. 1·95
4. Having four or more vaccine cicatrices	544	.. 0·55
5. Stated to have been vaccinated but having no cicatrix.. ...	370	.. 23·57

Again, during the last half of the eighteenth century, small-pox caused 96 out of every 1000 deaths from all causes, and in years when epidemics prevailed this number was sometimes nearly doubled, and now, from the year 1853—the year of compulsory vaccination—to the present time, the proportion is only 10 per 1000. This reduction, however, is confined entirely to very young children, the death-rate in children under five years of age having fallen 80 per cent., while it has actually increased largely in persons over 15 years. Of course, it is easy to understand that compulsory infantile vaccination has prevented the deaths from small-pox of a very large number of children, and has reduced the death-rate from this disease at all ages. After the age of fifteen, when the protecting influence has largely disappeared, unprotected adults form a larger proportion of the community than in the earlier periods when an attack of small-pox was much more frequent.

Not only have the frequency of epidemics, and the severity and fatality of the disease, been much diminished, but the researches of Dr. Collie into the cases treated in the London small-pox hospitals in the two epidemic years, 1871 and 1881, also show clearly (*a*) the larger proportion of severe cases amongst the unvaccinated, and (*b*) the need of re-vaccination about the age of fifteen. Dr. Collie found that, whilst the mortality per cent. of cases is practically identical in the unvaccinated, whether above or below the age of fifteen years, viz., thirty-seven or thirty-eight, the mortality in the vaccinated below fifteen years did not depend so much on the number and character of the scars as it did in persons above that age. Dr. Herbert Goude, Medical Officer of the Highgate Small-pox Hospital, said in 1893, in reference to his institution, where the attendants are all re-vaccinated, "We have now an unbroken record of fifty-eight years, during which no nurse or servant has contracted the disease even in a modified form, and this, too, though the nurses and attendants have on many occasions accidentally inoculated themselves with variolous

* Presidential address to the members of the Midland Branch of the Incorporated Society of Medical Officers of Health, October 7th, 1897.

matter, thus putting the protection afforded by vaccination to a really crucial test. We have had no injurious effects from re-vaccination beyond those apparently inseparable from the operation, such as malaise, and occasionally tardy healing of the vesicles."

The comparative immunity of the vaccinated from attacks of small-pox, and from death, if attacked, has been further confirmed by the experience of the city (Birmingham) in which we are now assembled. Its Medical Officer of Health, Dr. Alfred Hill, in commenting on the small-pox epidemic of 1893—95, after giving various figures in support of his position, sums up as follows:—"The experience of Birmingham, therefore, shows that vaccination confers almost absolute immunity from an attack of small-pox for the first five years, and practical immunity for the first ten years." Furthermore, "It appears that for ten years after its performance, vaccination conferred absolute immunity from death from small-pox, although amongst the unvaccinated of all ages, the disease had a mortality of over 30 per cent.; that is to say, by means of vaccination within ten years from the time of an outbreak, the deaths of 30 per cent. of the persons attacked may be prevented."

In Prussia, vaccination and re-vaccination were made compulsory in 1874, since which time the death-rate from small-pox has been reduced to one-tenth of what it was before (0·24 to ·02 per 1000), and it is stated that in the Prussian army no death from small-pox has occurred since 1874.

It is quite true that, while they admit that small-pox has wonderfully diminished in frequency and severity, the opponents of vaccination assert that this is chiefly, if not entirely, due to isolation and to improved sanitation. This is a point that would have had to be dealt with had it not been for the excellent paper on the subject in *Public Health* by Dr. McVail, who takes his facts from that most admirable book by Dr. James B. Russell, "The Evolution of the Function of Public Health Administration." Dr. McVail, from the history of Glasgow during this century, shows "that the difference in the small-pox death-rate of Glasgow, before and after the introduction of vaccination, simply represented the amount of vaccination practised in the city. Vaccination was a *vera causa*, and the only *vera causa* of the diminution of small-pox." He states what has frequently been proved by others, that "the lesson of greatest interest is, that in spite of insanitary conditions, which are hardly conceivable now-a-days, the Jennerian prophylactic had the same power to protect against small-pox that it has been shown to possess under all other varying circumstances and conditions, even in the case of those whose lives at the present time are spent in the wards of small-pox hospitals, in an atmosphere possibly still more abounding in the poison of the disease than were even the most crowded parts of Glasgow during small-pox epidemics a hundred years ago."

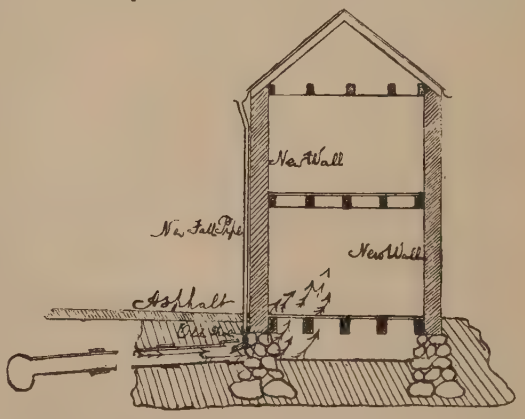
Again, J. C. McVail, M.D., writing on Vaccination and Sanitation, in the *British Medical Journal*, reviewing the progress of vaccination in this and other countries along with the concomitant alterations in the mortality from small-pox, states, "that we can say with confidence what the vaccination law is in any country, from a mere inspection of the small-pox mortality for some years;" and further, that "it cannot possibly be improved sanitation that has caused the remarkable changes in the mean death-rates for more than one reason. Compare Prussia with Austria—there is a sudden and striking change in the death-rate of Prussia in the period succeeding the law of 1874. Now Austria shows no such change in the death-rate, and Austria is still without compulsory vaccination, while Austria has participated in the sanitary improvements of the age. And, on the other hand, Prussia did not suddenly jump into an ideal sanitary condition between 1870 and 1880. But further, the reduction in small-pox mortality has not affected all ages alike, whereas an improved sanitation does affect all ages alike."

In concluding this portion of my subject I need not make more than a passing allusion to the report of the Royal Commission on Vaccination, as it has already been so ably and so frequently discussed in the Press and by the members of this Society. It is satisfactory to note that in the report vaccination is recognised as the preventive of small-pox; that the importance of re-vaccination is insisted upon not later than at the age of twelve years; and that the Commissioners are not prepared to recommend that the State should cease to require vaccination, and trust entirely to a voluntary adoption of the practice. To further this end, and to promote vaccination, it is suggested that every medical man should be a public vaccinator paid by the State, and subject consequently to official inspection in order to prevent abuse, and to procure a minimum standard of efficiency.

A SANITARY DEFECT.

By Wm. Jameson, C.S.I.

The subjoined sketch shows the sanitary condition of a house recently rebuilt in Northallerton. The old walls had been pulled down to just below the floor level, the new walls being built on the old "boulder foundations." The drain communicated directly with the sewer. The new 2in. fall



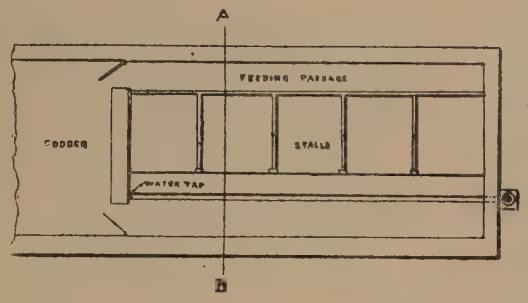
pipe was connected to the old shoe which was never disturbed, and was fixed in the end of the drain, and was completely choked up.

On the occurrence of typhoid fever the drain was examined, when it was found that the sewer gas passed up the drain, through the old foundations, and through the joints in the floor into the house. The yard being covered with asphalt made it almost impossible for any foul gas to escape into the yard. This work was carried out by a "joiner," joiners executing all the "plumbers' work."

THE SANITATION OF COWSHEDS, DAIRIES, AND MILKSHOPS.

By Dr. JAMES R. KAYE, Medical Officer, West Riding of Yorkshire.

THE importance of dairies, cowsheds, and milkshops in connection with the public health becomes every year more apparent, and consumers are gradually awakening to the dangers lurking in contaminated milk. No fewer than sixty-nine outbreaks of epidemic disease in this country have been distinctly traced to milk, and it has been demonstrated that the tubercle of man and bovines is intercommunicable. Milk is one of those articles of food which, if exposed to foul gases, the effluvia of decaying matter or to infection from persons, is readily contaminated, and it acts as an excellent nidus for the multiplication of the poison absorbed. Still, the impression gathered from an analysis of the reports of the local Medical Officers of Health is that there is a decided apathy and indifference



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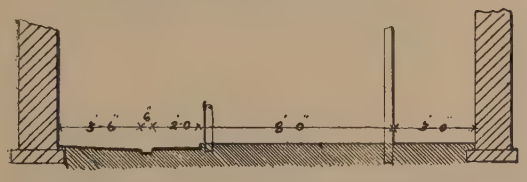


amongst Local Authorities in the enforcement of the regulations for the proper management of dairies, cowsheds, and milkshops. The Order of 1885 is intended to secure the registration of all premises where milk is sold, and it is the duty of the Sanitary Authority to make regulations for the inspection of cattle, and for prescribing and regulating the lighting, ventilation, cleansing, drainage, and water supply, for cleaning and maintaining cleanliness and every care against infection or contamination of the milk.

In many districts no regulations have been framed, and others have regulations but do not enforce them beyond, perhaps, whitewashing—hence the Order has been dubbed the "Whitewashing Order." In few reports is there any detail beyond a general statement that they have been inspected and found satisfactory or otherwise. It may be that structural difficulties seem to overawe the officials; still, drainage, so frequently in a bad condition, might easily be remedied, light could be provided or increased, and cleanliness insisted upon. There are, indeed, sufficient grounds to vigorously tackle these premises for the protection of public health, and also on behalf of the dairy farmers and milk purveyors themselves.

The official undertaking this work should be prepared with a sketch—somewhat after the fashion of the one annexed — to overcome the argument, so often advanced, that "it is easier said than done."

The floor should be made of concrete or flags set in cement. Some prefer the stalls to be clay floored. The dimensions indicated above are those generally adopted in good designs. In existing buildings, where space is limited, the feeding passage might be curtailed or left out, but it should be present in all new buildings.

There should be little difficulty with whitewashing and the renovation of the floors, and in the admission of light, or provision of proper water supply. These are essentials which ought always to be *enforced*. Some difficulty comes with ventilation, and in giving advice one should be careful to indicate means which will not cause cold air to pass directly on to the cows. The gratings, say 27in. by 9in. for every two cows, should be placed under the eaves, and a louvre should, if possible, be erected on the ridge. Until decisive action is taken it will be impossible to report satisfactorily on these premises.

One word regarding the tuberculin test for tuberculosis in cattle. This is a simple test which experience proves has yielded highly satisfactory results, though it is not altogether infallible. In many of the American States the Authorities carry out a regular system of examining all cattle and testing them by tuberculin. It is a liquid obtained by the concentration of glycerinised bouillon in which the germs of tuberculosis have been grown. In sound cows its injection has no effect, but in a tuberculous animal it produces symptoms indicative of the disease, so that in tuberculin we have a means not only of ascertaining the soundness of the animals yielding the milk supply or about to be used as food, but an agent whereby stockbreeders and farmers may largely eradicate tuberculosis from their animals.

Mr. Greenwood, of Ossett, writes: "This disease (tuberculosis) is known to be very common in the cow, and may undoubtedly be transmitted to the human species through the milk of tuberculous animals. The character of the cow disease which renders the milk dangerous has yet to be determined, though it has been ascertained that when the udder is affected the danger is undoubted."

ANOTHER L.G.B. ORDER ON WATER SUPPLIES.

THE Maidstone epidemic has certainly had the effect of "waking up" the officials at headquarters, and circulars to the various Councils are following each other in quick succession. In the one issued this week reference is made to the recurring tendency to sudden localised epidemics, in which the typhoid infection is distributed to large populations by means of the contamination of water, it points out that the Council is the body responsible under the Public Health Acts for securing to the inhabitants of their district a proper and sufficient supply of water, desires to impress upon them the importance of taking the matter into their serious consideration with the object of guarding their district against dangers the gravity of which has

been sufficiently shown by recent examples. Where the Council have themselves constructed or purchased any waterworks it is their duty in pursuance of Section 55 of the Public Health Act, 1875, to provide a supply of "pure and wholesome" water, and in order to fulfil this obligation it behoves them to exercise every precaution to secure that the water which they deliver to the consumers shall be protected from risk of contamination; and where means of filtration are necessary these should be adequate and maintained in a thoroughly efficient condition. Not only are the Council thus under a responsibility for the wholesomeness of the water which they themselves supply, but they should by careful inquiry make themselves acquainted with the sources, nature, and quality of the various supplies in all parts of their district, and should take all such steps as may be within their powers with the view of supplementing or improving the supplies.

The Board observe generally that accurate information should be procured in such matters as the following:—(1) Whether water is derived from gathering grounds or from springs; whether drainage from human habitations, farmyards, and the like, finds its way directly or indirectly into the reservoir or to any part of the water service; and whether risk of access to the water of human excreta and similar refuse is likely to arise. (2) Where water is derived from deep wells; whether surface or other water, liable to be contaminated by drains, sewers, cesspools, and the like, reaches or is liable to reach the wells; the existence and direction of fissures in the strata deserve special consideration in this respect. (3) Where water is derived from shallow wells; whether the wells are so circumstanced that they run risk of contamination by reason of drains, cesspools or middens, or by the deposit of manure in or on the ground in the neighbourhood of the wells.

IS CIGARETTE SMOKING INJURIOUS?

It is a popular delusion that when the smoke of a cigarette is inhaled it pervades the air vesicles of the lungs, and the nicotine it contains is all absorbed into the blood through the delicate respiratory membrane. As a matter of fact, the smoke reaches only to the larger bronchial tubes, probably in a majority of instances not to a point much below the larynx. To the mucous membrane of these large air passages the smoke does little harm as an irritant, although it may aggravate pathological conditions already present. The surface by which nicotine is absorbed into the blood is much larger than that of the mouth, however; so that, although relatively only a little of the poison is contained in a cigarette, much more of it finds its way into the system than when the smoke from a cigar or pipe is simply drawn into the mouth and at once blown out. The inference to be drawn from this is that the inhalation of tobacco smoke is a bad practice. That it is more likely to be indulged in by persons who smoke cigarettes than by those who restrict themselves to cigars and the pipe may be readily conceded. At the same time it is quite certain that many smokers inhale cigar smoke and pipe smoke at times, if not habitually; sometimes they do it involuntarily. Equally absurd is the common assumption that cigarettes are especially injurious on account of their containing other poisons besides nicotine. Ledaux, who has subjected various brands of cigarettes to chemical analysis, found absolutely no evidence of any other drug but nicotine in the tobacco, and in the paper a harmless quantity of cellulose. It is, indeed, the height of absurdity to suppose that cigarettes are sophisticated with opium. Opium, as has been often said, is too expensive to be used for such a purpose. The chief evil of tobacco is its constitutional effect upon the nervous system, and as the cigarette habit is so common in boys, it is to be deplored on that account.

Sanitary Inspectors' Associations.

THE NORTH-WESTERN AND MIDLAND.

The tenth meeting for the current session of the above Association was held at the Royal Institution, Colquitt-street, Liverpool, on Saturday, January 8th, 1898. There was a good attendance of members, including representatives from Liverpool, Manchester, Crewe, Rhyl, Wallasey, Ashton-in-Makerfield, Astley Bridge, St. Helen's, Lymm, Waterloo, &c., the president (Dr. Vacher) occupying the chair.

The formal business having been transacted, Messrs. A. H. Fidoe, W. Vale, J. Ablett, and P. V. Rigbey, district Sanitary Inspectors, Birmingham, and W. J. Bruford, district Sanitary Inspector, Manchester, were elected as members, the Council's nomination of Mr. A. D. Greatorex, Borough Engineer, West Bromwich, as an honorary member, being also approved. Some additional nominations having been received, the chairman called upon Dr. James Niven, M.A., M.B., Medical Officer of Health, Manchester, to deliver an address on :—"Public Administration Procedure in connection with Infectious Diseases."

The lecture, which was of a highly interesting character, dealt largely with the methods employed by the Public Health Department of Manchester, complete sets of the various forms, &c., in use in that city being distributed to the members for reference. Cases of infectious disease were notified to the Medical Officer under the Manchester Provisional Order of 1881, the medical attendant stating on the certificate the name, age, and address of the patient, and also giving the name of occupier, or other person having the charge or control of the building or room, the nature of the disease, the medical attendant being also requested to state as to whether or not the patient was fit for removal to the hospital. Where the Sanitary Inspector had reason to suspect the existence of infectious disease, it was the custom for the Medical Officer of Health to request a medical man to visit and report on the case. Under this dual system there was less danger of cases escaping notification. The next point to be discussed was the formal report on the case, this duty devolving on the Sanitary Inspectors, the amount of work done in this respect being most remarkable. Tact and method were the two prerequisites to a successful report, the last named being best secured by a careful attention to the printed requirements of a form which was specially devised for different diseases, according to the special facts which required to be elicited. In the case of enteric fever inquiries were instituted into

the subjects of the drinking water, milk supply, shell fish, ice cream, and food supply generally. From the reports so supplied much valuable information had been extracted, and some interesting relations between soil pollution and infectious disease had been made apparent.

Immediate information of outbreaks of infectious disease amongst children attending schools was transmitted to the head teachers, and in case of several cases occurring at the same school, a special circular was despatched with a view to securing the aid of the teachers in the investigation of cases which had been overlooked. A list of cases of infectious disease notified was also daily transmitted to the School Board offices, similar intimations being given when disinfection had been satisfactorily carried out. Notice was given to the chief librarian when it was believed that infected persons had been handling books borrowed from the Public Free Libraries. The question of isolation received the utmost attention, and the proportion of patients suffering from scarlet fever removed to hospital was unusually large. Their hospitals appeared to be well appreciated. Although measles and whooping-cough were not notifiable diseases in Manchester special precautions were taken to prevent the spreading thereof. The school attendance officer left handbills at houses where school children were stated to be suffering from measles directing the parents to refrain from sending children to school until four weeks should have elapsed from the commencement of the last case of measles or whooping-cough as the case might be ; and where cases came under the cognisance of the Health Department, notices were sent to the teachers.

The sanitary officers made a brief report when these diseases resulted fatally, and in consequence of such inquiries, and also by receiving reports from the school attendance officers it was possible to ascertain if a considerable number of cases were associated with any one particular school, in which event closure followed ; the closing of the Infants' Sunday-school, if there was one held on the same premises, being also suggested.

As regarded disinfection, it was their custom to wash the floors, walls, and ceiling with a solution of chlorinated lime, the bedding and clothing being removed and subjected to the action of moist steam. Chlorine gas was evolved in the infected rooms, but no very great importance was attached to aërial disinfection.

Dr. Niven then went on to explain the methods adopted for the prevention of diarrhœa, dysentery, and consumption, pointing out the great necessity that existed for educational work in this direction. Where fatal cases of these diseases were reported, special reports on the subject were made by the Sanitary Inspector, and every facility as regarded disinfection was offered in the case of consumption.

A final branch of their work, and one to which he (Dr. Niven) attached great importance, was the special facilities which the Manchester Corporation offered to medical men in the diagnosis of suspected cases of diphtheria and typhoid fever. The Corporation had secured the services of Prof. Delépine, of Owens College, for the purpose of undertaking a bacteriological examination of the material obtained from cases suspected to be suffering from these diseases at the request of the practitioner in attendance, and it was most satisfactory to be able to state that in the majority of cases medical practitioners did avail themselves of the opportunities so afforded.

At the close of his address, Dr. Niven gave a practical illustration of the working of the portable steam disinfector invented by Professor Delépine.

The CHAIRMAN opened the discussion, which was rendered brief owing to the lateness of the hour, and was followed by Mr. WM. URQUHART (Crewe) and R. JOHN HUGHES (Rhyl), a hearty vote of thanks being accorded to Dr. Niven. The lecturer's reply brought to a close a most enjoyable and instructive meeting.

ANNUAL REPORTS.

IN the matter of conciseness we commend the following report presented by Dr. T. Haworth, Medical Officer of Health, to the Filey Urban District Council :—"In presenting my report for the year 1897, I have to inform you that the total number of deaths for the year is 54, which gives a a death-rate of 20·7 for the year. This includes the deaths of three visitors, one being a baby, who was accidentally burned to death, the remaining two being elderly people who were more or less invalided, with a tendency to apoplexy, and who succumbed to an attack whilst visiting Filey. By excepting the three visitors named, the death-rate in the residential population of Filey would be 19·6, a slightly lower death-rate than that for 1896. The deaths in the last quarter were six, giving a death-rate for the quarter of only 2·3, which I believe to be one of the lowest death-rates for a single quarter in Great Britain. Considering that during the year we were visited by an epidemic of scarlet fever, which caused the death of six children, I think we may congratulate ourselves that our death-rate is so satisfactory, after passing through this general epidemic. Looking at the deaths for the year, I find that 16 persons passed the age of 65, there being 37 males and 45 females. The number of births in the year was 82, two more than the number for 1895, giving a birth-rate of 31·5 per 1000. There has been only one case of scarlet fever reported in the quarter, and I think that the Council may look upon the epidemic now as being quite stamped out. There were a few cases of measles in November, but I have heard of no further cases during the last month. I think it would be well for the Council to include measles in their notification list. I believe that during the year we have been quite free from typhoid fever, which speaks well for our drainage and water systems. I have heard few complaints of nuisance, and I consider the removal of refuse matter has been carried out most admirably. I am very pleased that the Notification and Prevention Acts have been adopted, and are now in force, and I hear that the Board are continuing their efforts for a small isolation cottage, with the necessary disinfecting apparatus. There is no need to build a costly one for a town of the size of Filey, but a small and efficient one is absolutely necessary if we are to protect ourselves against zymotic diseases. The Sanitary Inspector and myself have made

monthly visits to the schools which were closed, to the bakeries, workshops, and slaughter-houses, and have examined the milk cans, and have found them all in a satisfactory condition."

INSANITARY BARBERS' SHOPS.

In these days of antisepsis it seems rather strange the barber shop has not attracted more attention than it has. There is probably no medium better for conveying infection than soap lather; and yet in the average barber shop hundreds of people are lathered from the same cup, in which more or less infective material is apt to remain.

Recently a barber was summoned before the police-court for operating in his shop while himself suffering from an infectious disease—diphtheria. Notification had been received from the medical man in attendance, and the barber warned, but nevertheless he continued to ply his calling, and the evidence went to show that at least one case of diphtheria was communicated through him.

It would seem, considering the dangers that threaten, power ought to be conveyed to Sanitary Inspectors to inspect barbers' shops, their paraphernalia, &c., and direct how the management of the same shall be carried on.

The fact that barbers' razors are dipped so often into hot water probably accounts for the fact that so few cases of infection are reported from this source.

Reviews.

House Drainage Manual. A Guide to the Design and Construction of Systems of Drainage and Sewage Disposal from Houses. By Wm. Spinks, Assoc. M. Inst. C.E. With tables, illustrations, extracts from the Public Health Acts, Metropolis Management Acts, and model bye-laws relating to house drainage. Price 5s. Biggs and Co. 306 pp.

We are pleased to welcome the publication of this book, not because there was a dearth of books on house drainage, but because there was no good book published dealing with the practical side—as this book does—of the designing and construction of underground drains. This book is just the one which can be safely put into the hands of Sanitary Officers who are entrusted with the superintendence and construction of house drainage, external to the house. There is no attempt to deal with the plumbers' work as appertaining to house drainage, and we think this is wise, as the treatment of the subject requires a volume in itself, such as that of Mr. S. S. Hellyers' "Plumber and Sanitary Houses."

The first nine chapters of the book comprise the following subjects, viz., "Sanitary Surveys," "Defective Drainage," "Requirements of Houses," "Planning and Arrangement of Drains," "Subsoil Drainage," "Inclination of House Drains," "Pipes and Jointing," "Ventilation of Drains," "Intercepting Traps," while Chapter X. is devoted to "The Setting-out and Construction of Drains." This chapter describes very fully how to take levels and prepare the working section, the method of laying pipes to the gradient by the sight rail and boning-rod, excavating and timbering of trenches, connection to sewer, hydraulic testing for soundness of joints, and how trenches should be refilled.

Subsequent chapters deal with cellar drainage, the construction of manholes and lampholes, the disconnection of waste pipes and gully traps, different forms of traps, the flushing and cleansing of drains, and the necessary apparatus for the purpose, such as syphons, tippers, &c.

There is also a valuable chapter on the disposal of sewage from isolated houses, and a description, with illustrations, of land purification, chemical precipitation, and the varying forms of tanks used for the purpose, including the Candy tank and the Dortmünd tank. The Natural Purification Company's (Nottingham) process, the International Company's, and the Magnetite Company's processes of sewage purification are also described, while the latest developments of sewage purification, *i.e*, on biological principles, as carried out at Exeter by the septic tank and at Sutton by the bacteria tank, are fully stated. Illustrations are also given of the mode of construction of bacteria tanks and filters, as well as details of the method of working, the author stating that he has "several times visited the filters at Sutton, and so far as relates to the clearness of the effluent, the absence of all smell both from it and the filters, I can personally testify as well as to the disappearance of the sludge."

The concluding chapters treat of legislation relating to house drainage under the Metropolis Management Acts and under the Public Health Acts. The book, as we have already indicated, will be found most useful to all persons whose duty it is to design or superintend the drainage of houses, and with the details given as to the construction of sewage filters and various forms of tanks, it will be especially valuable if used in conjunction with the same author's book on "The Drainage of Villages," to those who have to prepare schemes for the sewerage and sewage disposal of villages. The book is well written and clearly printed, and may be safely recommended to architects, surveyors, and inspectors.

Obituary.

MR. ERNEST HART.

We regret to announce the death of Mr. Ernest Hart, editor of the *British Medical Journal*, and for many years editor of this journal, which took place at an early hour on Friday morning at Brighton, where he had been staying for some months for the benefit of his health. Early in September Mr. Hart, who had for many years suffered from diabetes, underwent amputation of the leg. The operation, which was performed by Mr. Lockwood, was successful, and led to such an improvement in Mr. Hart's health that at first there seemed to be every prospect of his returning to active work at no distant date. Mr. Hart was born in London in 1836, and received his early education at the City of London School, of which he ultimately became captain and Lambert Jones Scholar. Having chosen medicine as a profession, he entered at St. George's Hospital, where he had a distinguished career as a student. He became a member of the Royal College of Surgeons of England in 1856, and taking up eye diseases as a speciality, he acquired an extensive consulting

practice in the City. At the age of twenty-eight he was appointed ophthalmic surgeon at St. Mary's Hospital, becoming later Dean of the Medical School. He published various papers in the "Transactions" of the Royal Medical and Chirurgical Society, and in the Moorfields Ophthalmic Hospital reports, and introduced into ophthalmic practice some modifications which have since been widely adopted. Nor did he confine his attention to diseases of the eye. His name is associated with a method of treating popliteal aneurism, which he was the first to use in this country.

Mr. Hart's real life-work, however, was done in the field of journalism. At the age of twenty-two he became a member of the staff of the *Lancet*, at that time under the vigorous editorship of its founder, Thomas Wakley. He took a leading part in the exposures which led to the appointment of a commission of inquiry into the state of the London workhouse infirmaries, and ultimately to the establishment of the Metropolitan Asylums Board, and to a thorough reform of the treatment of the sick poor in workhouses throughout the country. Another campaign which owes its success in large measure to Mr. Hart is that against baby farming, the issue of which was the Infant Life Protection Act. In 1866 Mr. Hart was appointed by the council of the British Medical Association to the editorship of the *British Medical Journal*—a position which he continued to hold till his death. He was till recently chairman of the Parliamentary Bills Committee of the British Medical Association, and was also for many years chairman of the National Health Society. The record of his public work covers nearly the whole field of sanitary legislation during the last thirty years. In the amendments of the Public Health and of the Medical Acts; in the measures relating to the notification of infectious disease, to vaccination, to the registration of plumbers; in the improvement of factory legislation; in the remedy of legitimate grievances of Medical Officers of the Army and Navy; in the removal of abuses and deficiencies in the management of barrack schools, and in the promotion of many other reforms, Mr. Hart worked strenuously and successfully. In 1894 he visited India, and at the Sanitary Congress held in Calcutta he denounced the sanitary backslidings of the Indian Government, particularly in regard to the prevention of cholera.

In addition to innumerable editorial articles in the *British Medical Journal*, Mr. Hart wrote occasionally in the *Nineteenth Century*, the *Century*, the *Forum*, in this, and in other periodicals. He contributed chapters on cholera and on vaccination to the great "System of Medicine" now in course of publication under the editorship of Professor Clifford Allbutt; and a chapter on waterborne diseases to the "Twentieth Century Practice of Medicine." He was the author of reports on the influence of milk in spreading zymotic disease, on vaccination, waterborne typhoid, &c., which have been recognised as of great value by Medical Officers of Health and epidemiological authorities. He wrote also on the ancient arts and artists of Japan, a subject on which he had qualified himself to speak by a visit to Japan, and by the formation and study of one of the best collections of specimens of Japanese art in Europe. In 1893 Mr. Hart received the honorary degree of D.C.L. from the University of Durham, and it is understood that a similar honour would have been conferred upon him by the M'Gill University had he been able to attend the annual meeting of the British Medical Association held last August at Montreal.

Mr. Hart married a daughter of Mr. Alexander Rowland, of Lewisham, a lady who is herself well known as an accomplished writer and a philanthropic worker. He leaves no issue.

General News.

BIRMINGHAM.—The Sanitary Institute is to be invited by the City Council to hold its 1898 Congress in this city in September.

RUGBY.—It has been decided to build additional slaughter-houses, and, when needed, to endeavour to purchase land in the vicinity for extending the market.

BEDWORTH.—A public meeting is announced for the purpose of considering the proposal of a London firm to supply Bedworth and adjoining districts with water.

NEW MILLS.—The Urban District Council, upon the advice of the engineer, Mr. Bancroft, has decided to advertise for meters for the Ollersell Waterworks, and to divert the road near the Workhouse.

EAST DEREHAM.—At a recent meeting of the Urban District Council a lengthy report was submitted by the Sanitary Committee with regard to the sanitary condition of the town, and a resolution was passed directing further facilities for cleansing the town.

BEDALE.—The Rural District Council has decided that steps be taken to carry out the water supply scheme submitted by Messrs. Fairbank and Son, of York, and that it be sent to the Local Government Board for approval. It was stated that a water supply could be obtained from Spring Wood at a cost of £2850.

LUDLOW.—A special meeting of the Town Council was held recently to receive a report from the Sanitary Committee as to prohibiting the sale of milk in the borough from a certain dairy in consequence of an outbreak of typhoid fever, and to make whatever orders on the whole question might be deemed advisable.

GOOLE.—The Urban District Council has sent a deputation to consult Mr. de Rance, of Manchester, with a view to steps being taken to improve the present water supply or to obtain a new one. It has also been decided to appoint a gas and water manager, at a salary of £300 a year, instead of continuing the dual control by sub-managers and a consulting engineer.

LLANELLY.—A peculiar type of measles is raging in Llanelly, hundreds of cases being now under treatment. So serious has the outbreak become that several of the largest Board Schools in the town have been closed. The doctors describe the epidemic as one of German measles, the symptoms differing from those usually present in ordinary cases of measles. The visitation is especially present in the Lakefield and Greenfield districts, almost every house where there are children being affected.

PICKERING.—The Medical Officer reports that influenza of a very bad type is sweeping over the district.

CHISWICK.—The District Council has entered into an agreement for the purchase of a site in the Brentford district for the erection of an isolation hospital.

PEMBROKE DOCK. — The Local Government Board has sanctioned the scheme for supplying Pembroke Dock with water from the Milton springs, at a cost of £27,000.

TOWCESTER.—With regard to Eastcote water supply, Mr. J. Eunson (the engineer) reports that he estimates the cost of the scheme will be £350, exclusive of land or rights.

BO'NESS.—Mr. Thomas Beattie, Bo'ness, has secured the contract for the construction of a new storage reservoir at Lochcote and other works in connection with the new water supply for Bo'ness.

CHESHIRE.—A memorial has been adopted to the County Council of Cheshire asking that body to establish a county laboratory for the chemical and bacteriological examination of water, milk, &c., for the county.

LANGTON MALTAVERS.—A Local Government Board inquiry has been held into an application from the Rural District Council to borrow £1000 to sink a well and construct a reservoir and pipes to supply the parish with water.

ROWLEY REGIS.—Mr. Fiddian, of Stourbridge, has been instructed by the Urban District Council to prepare the scheme for the improvement of the insanitary area known as Tibbett's Gardens, both as to street-making, drainage, water supply, and gas.

NOTTINGHAM.—The second reading of a report relating to the reconstruction of a portion of the Leen Valley sewer and other works connected therewith has been agreed to, and also the construction of an underground lavatory at a cost of £1500.

WEST BROMWICH. — In consequeuce of the recent outbreak of typhoid fever at Maidstone, the Sanitary Committee of the Town Council has had the South Staffordshire Waterworks Company's water analysed, and the results are eminently satisfactory.

MARKET BOSWORTH. — The Rural District Council has decided to erect an isolation hospital at Ibstock on account of an alarming outbreak of scarlet fever. Ibstock has a population of 3000 to 4000. Scarlet fever was first reported on September 15th, and there are now fifty-three cases.

STAFFORD. — A Local Government Board inquiry has been held with respect to an application by the Town Council for sanction to borrow £4000 for purposes of water supply, and £20,000 for the purposes of the Stafford Corporation Act, 1896. In view of the general adoption of the water-carriage system of sewerage, the Corporation decided to increase the water supply by erecting additional machinery, &c., and under the Act of 1896, it has power to convert existing pan-closets into water or slop-closets in those cases where owners of property had complied with the wishes of the Town Council, and had abolished the vault-closet system for the Rochdale tub system.

Sewerage Schemes.

[TO MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

THE Local Government Board has sanctioned the borrowing by the New Mills Urban District Council of £6532, for sewerage purposes.

THE sanction of the Local Government Board to a further loan of £984 for the drainage of Aston Fields has been received by the Bromsgrove Council.

MR. DIBDIN, late chemist to the L.C.C., has been asked upon what terms he will advise the Shipley Council as to the treatment of the sewage of the district.

THE Rural District Council of Wirral has decided to apply to the Local Government Board for permission to borrow £300 to lay down experimental Dibdin's filtration tanks to improve the sewerage system at Prenton.

A LOCAL Government Board inquiry has been held at Teignmouth concerning the District Council's application for leave to borrow £640 for works of sewage disposal, and for the erection of a mortuary and disinfecting chamber.

THE scheme of the engineer for the drainage of Cefn Bychan and Newbridge, at a cost of about £2000, has been submitted to the Wrexham Rural District Council. Negotiations are to be opened up for the outfall and the sewer easements.

THE Haywards Heath Urban District Council has requested Mr. Dibdin to advise it as to the construction of the necessary tanks for sewage disposal, to prepare plans, supervise the works, make necessary analyses, and put the process in working order.

A COMBINED scheme for improving the outfall of the sewers of the town of Calcutta proper, and for draining the suburbs and the area between the canal and the Circular-road, was commenced during last year. Larger pumps are to be fixed at Palmer's Bridge, a new high-level sewer is to be constructed which will meet a high-level sewer intended for the suburban outfall, and the combined sewage of the town and suburbs is to be carried in a channel lined with masonry to a new outfall at Baintolla, some miles below the present outfall in the Balliaghata Canal. A main sewer is also to be constructed which will enter from Watgunge on the Hooghly bank, and passing under Tolly's Nala by gravitation, will discharge at a station to be established near the rifle range on the Eastern Bengal State Railway. The suburban outfall will be precisely similar to that now working at Palmer's Bridge. There will be two pumping stations for the suburban main sewer, one at Budge-Budge-road, and one at the outfall. The temporary project for the suburban drainage has been carried out.

THE Urban District Council of Staines is taking steps to obtain a further loan of £3500 on drainage account.

A LOCAL Government Board inquiry has been held at Manchester into the application of the Corporation to borrow £180,000—£170,000 for the purposes of sewerage and sewage disposal and £10,000 for market purposes. There was no opposition to the application.

A LOCAL Government Board inquiry has been held at Somerset into the application of the County Council for consent to take proceedings under part three of the River Pollution Prevention Act, 1896, against Messrs. Coombs and Co., of the Clandown and Radstock Breweries and Hotels Co. Ltd., in respect to the alleged pollution of the river Somer.

IT is proposed by the Epsom Rural District Council to construct certain works on land on Roxley Farm, which is within the district of the Surbiton District Council, for receiving and distributing the effluent water from the sewage tanks, and enabling it to be treated on the land in question by means of irrigation or filtration, with an outlet for the final discharge of the water into the Hogg's Mill river. The Epsom Council give three months' notice of their intention to construct the works in question.

AT a recent meeting of the Hampton Wick District Council the Drainage Committee reported that they had directed the clerk to send to the gas company for their observations a copy of the letter from the Native Guano Company, on the subject of the alleged gas refuse in the sewage delivered at Kingston. A reply from the gas company was read, in which it was stated that no deleterious matter was, or ever had been, discharged into the Council's sewers, and the charge referred to was incorrect so far as this company was concerned. The letter was referred to the Drainage Committee to enable them to make independent inquiry.

AT a recent meeting of the Sunbury District Council, a report was read from Mr. Dibdin upon the question of treating sewage by bacteria. This was the outcome of a visit Mr. Dibdin made to Sunbury. He stated what would be required, the tank capacity, &c., in respect to the single treatment followed by land (with the use of coarse beds only), and the double treatment (with coarse and fine beds); but he did not advise the Council what to do in the matter, or as to the probable cost. Mr. Anstie explained that the cost of the single treatment, as proposed by Mr. Dibdin, would be £1528, including all charges. With regard to the double treatment, he disagreed with Mr. Dibdin in one or two details. He would advise that the coarse beds remain the same as in the first system, and that the fine beds be separate. That would cost altogether about £2800. The saving in chemicals and sludge would be about £80 a year. Finally, it was decided to apply to the Local Government Board, asking it to allow the Council to adopt the bacteria system with the coarse beds only.

THE Irvine Town Council has decided to approach the Local Government Board asking an opinion on the scheme for conveying the drainage by means of pipes beyond the weir.

THE drainage of St. Helen's, Crawford Lodge, Ashcliff, and Binrock requiring to be carried out beyond the filling up of the Esplanade ground in front, the Burgh Engineer for Dundee has been instructed to see to the work being done. The estimated cost is about £100.

WITH reference to the improvements to be carried out in the sewerage system at Portrush, the cost has been estimated at £300, but the whole work could be carried out for £50 if the flushing tank, which would cost £50, was omitted. The Town Commissioners have decided that the improvements be carried out upon this understanding.

AT the last meeting of the Gomersal District Council, two letters were read from the Rivers Board with reference to the drainage of Great Gomersal, the latter of which intimated that the Board would now be satisfied if it was kept informed from time to time of the progress of the scheme. Later on plans and sections of the scheme, with a detailed report and estimate of cost, were laid before the Council by a representative of Mr. J. Waugh, engineer, Bradford. The estimated cost is £7577.

A START has just been made with the new main sewer system adopted by the Douglas Town Council, after debates and opposition extending over years, the last opposition of a month ago having led to the withdrawal of the tender of a Glasgow firm for carrying out the land section of the work at a cost of £26,000. The revised estimated cost, excluding any rise that may result from the withdrawal of the main tender, is £50,000. The section of the work just started is the new outfall, which will give a new discharge point for the sewer in the deep sea, about a quarter of a mile to the north-east of Conister, where there is nine hours' ebb tide, which will carry the sewage clear of the bay.

MR. ED. COUSINS, civil engineer, London, has forwarded to the Penybont Main Joint Sewerage Board his report on the best system of dealing with the sewage of the district, basing his estimates on a fifteen years' increase in population to bring it up to 20,000. He decided against an open outfall for sewage into the sea at low-water mark, and submitted two estimates for the Board to consider. These were:—(1) For the sea outfall, the sewers having self-cleansing gradients and a brick tank sewer for containing the sewage at times when the outfall sewer is tidal locked, including penstock, tidal valves, &c., £13,642; (2) for the septic tank scheme, with filter beds on the sand banks and effluent drains into the river, capable of dealing with a population of 20,000—£18,799. The Board has unanimously decided not to take the storm water from the Bridgend and Penybont areas into the scheme, as that would cost an additional £7000, and has resolved that Mr. Cousins be invited to a conference with the Board on the scheme prepared by him.

AT a recent meeting of the Sewerage Committee of the Aberdeen Town Council a report from the Sanitary Inspector with regard to the condition of the sewage at Kepplestone was remitted to the Burgh Surveyor for further report. It was agreed to carry out an extension of a sewer in Craig-place, Menzies-road, at an estimated cost of £58. The following tenders for the extension of sewers were accepted:—Brighton-place, Mr. Roderick M'Kay, £20 10s. 9d.; Bayview-road, Mr. John Bain, £85 17s. 2d.; Dunbar-street, Mr. A. M'Kay, £85 12s. 11d. The tenders of Mr. John Hector for supplies of fire-clay pipes and syphons, being the lowest offers, were accepted.

FOR some considerable time past the question of the drainage and sewerage of Castle Donington has engrossed the attention of the Local Authorities. The Local Government Board has plainly intimated that by some means or other a better system of drainage must be adopted as early as possible. The authorities have at length decided to inaugurate a system of sewerage and drainage on approved scientific principles, viz., precipitation with irrigation. A deputation was sent by the Parochial Committee to Kimberly and Tibshelf, where this principle is already in operation, and they were well satisfied with what they saw. The workings were in splendid order, despite the fact that the day of their visit was not one of the most favourable for their purpose. The result is that the responsible authorities will proceed to the adoption of a similar scheme for the disposal of the sewage of Castle Donington. The scheme is estimated to involve an outlay of £6500, which amount includes the cost of a duplicate engine and other appliances ; but as it is thought that several of these items are non-essential, it is expected that the estimate will prove to be considerably above the actual cost.

THE Town Council of the metropolis of Natal seems to have definitely decided upon introducing the water-borne sewage system into that town, the consequence of which will be a great demand on home firms for the necessary sanitary appliances, house fittings, &c. As it is impossible to get the natives to properly use the ordinary conveniences, special latrines will have to be supplied for their accommodation, and in catering for these it would be well for home firms to send experts to ascertain the special requirements of the situation. The new installation will involve an increase of the water supply to the town, which will be drawn from the Umsindusi, either above the Edendale Falls or at Fort Napier, in the former case involving the acquisition of heavy steam pumping plant, either intake necessitating considerable expenditure in piping, besides the construction of storage reservoirs. A separation of the surface water drainage and the sewerage systems is favoured in some quarters. The installation of a sewage farm with the necessary machinery and plant, with dust and sludge destructors, is also contemplated. Modifications are also likely to be introduced in connection with the present excellent potable water supply in the direction of the introduction of filtering beds, the water being at present unfiltered, and merely captured and stored in three reservoirs of a total capacity of 2,200,000 gallons.

Lighting.

THE Urban District Council of Whitchurch has decided to acquire the gasworks at a cost of £34,500.

THE Bradford Corporation has decided to advertise for a deputy manager for the gas works at a salary of £250 per annum.

THE plans of the new gasworks at Perth were finally passed at a special meeting of the Gas Commission held recently.

THE Eccles Town Council has decided to appoint Professor Dixon to test the gas supplied to the borough by the Salford Corporation.

THE Coventry Council has formally consented to the promotion of the Gas Bill, under which it is proposed to borrow £250,000.

THE Salford Borough Council has resolved to ask the Local Government Board to sanction the expenditure of a further sum of £50,000 on its electric light undertaking.

THE Morley Town Council has resolved to promote a Bill in next session of Parliament to obtain powers to purchase the local gas company's undertakings, and for other purposes.

THE Lighting Committee of the Brighton Town Council has appointed a Sub-Committee to consider and report upon the best means of lighting the public streets by electricity.

A LOCAL Government Board inquiry has been held at Wokingham into the subject matter of an application by the Corporation of the town for the sanction to borrow £1500 for the purpose of extending the local gasworks.

A PETITION to the Bedfordshire Corporation for the reduction of charges for electric current to 3d. per unit is being signed by consumers, who also consider that the rent charged for meters is 50 per cent. too high. The light has now been installed three years.

AT the monthly meeting of the Eccles Town Council, the proceedings of the Town Hall and Electric Lighting Committee included a recommendation that tenders be accepted to the amount of £9392 for the carrying out of works of electric lighting in the borough. The proceedings were confirmed.

AT the last monthly meeting of the Whickham Urban District Council the Committee appointed to inquire into the advisability of lighting the Marley Hill district with electricity recommended that lamps should be fixed as follows :—Marley Hill, 12 ; High Row, 6 ; School Houses, 2 ; Byer Moor, 8 ; and Marley Hill Hole, 4 ; making a total of 32 lamps. The price for the complete installation is specified to be £165 net, and a yearly charge of £55 4s.

A Local Government Board inquiry has been held at Southowram into the application of the District Council for sanction to borrow £2700 for street improvements, and £500 for public lighting purposes.

A Local Government Board inquiry was held at Croydon on Friday, the 7th inst., into the application of the Town Council to borrow several sums —amongst others £5000 for electric lighting purposes.

Consent has been given by the St. Faith's District Council to the scheme of the Norwich Electricity Company, who propose to apply for powers to extend their mains to Catton and Sprowston.

The Windsor Electrical Installation Company has just completed a contract for the supply of steam from the central lighting station to one of the Windsor hotels for laundry, heating, and cooking purposes.

The Mumbles (Glamorgan) Local Board has received an offer from Messrs. Weaver and Co., for the electric lighting of a large area of the district at a cost not to exceed the amount at present paid by the Council for gas.

The Dundee Town Council has decided to purchase a large piece of ground to the east of the present gasworks at a cost of £9000, exclusive of the annual feu duty, in order to carry out certain proposed extensions.

Owing to the omission to lay down in duplicate the plant supplying Maritzburg with electric light, that town's lighting arrangements have recently been in serious danger of breaking down. For some time the apparatus has been running under considerable difficulties, and the attempts of the engineers to obtain some fresh coils in Durban or in Johannesburg having failed, they have been forced to resort to makeshift constructions out of such materials as were locally available until the requisite coils arrive from England. Their present difficulties will doubtless enforce the necessity existing in all such cases of duplicate installations if intermission in the lighting services of towns is to be avoided.

Personal.

Mr. W. A. Peake has been appointed Inspector of Nuisances for the rural district of Gnosall.

Mr. T. G. Dickson has been appointed Medical Officer of Health for the urban district of Hay.

Mr. W. F. Ward has been appointed Medical Officer of Health of the Blyth district of Worksop.

Mr. J. R. M. Richmond has been appointed Medical Officer of Health for the rural district of Overton.

Mr. Walter Crowther has been reappointed Inspector of Nuisances and of Dairies and Cowsheds for the Urban District of Shelf, at a salary of £20 per annum.

Mr. R. Lord has been appointed Inspector of Nuisances for the borough of Loughborough.

Mr. E. T. Whitaker has been appointed Medical Officer of Health for the rural district of Blymhill.

Mr. H. N. Edwards has been appointed Medical Officer of the Flanstead district of Hemel Hempstead.

The salary of Mr. Hingley, Sanitary Inspector for Darlaston, has been increased from £80 to £95 per annum.

The Atcham Rural District Council has increased the salary of its Surveyor, Mr. John Morris, to £200 per annum.

Mr. C. F. Gettings, District Surveyor to the Norfolk County Council, has been appointed an Assistant Engineer on the Grand Junction Canal.

Mr. Roger K. Hamilton, of Hasland, has been appointed Medical Officer for the Hasland District of Chesterfield at a salary of £17 per annum.

The Local Government Board has sanctioned the reappointment of Dr. J. T. Haworth as Medical Officer for the Urban District of Filey, at a salary of £20 per annum.

Mr. Charles Wood has been promoted from the position of deputy-manager to that of Gas Engineer to the Bradford Corporation at a salary of £600 per annum.

Dr. Charles L. B. Stares has been appointed Assistant Medical Officer at the Infirmary under the Clapham and Wandsworth District Council at a salary of £120 per annum.

Mr. J. F. Stowe, C.E., has been appointed Engineer and Surveyor to the Urban District Council of Bridlington, in succession to Mr. R. R. Brown, who held the office for eight years.

Law Cases.

A DISPUTE ABOUT DRAINS.

Mr. Huxley, of Theydon-grove, Epping, Essex, was summoned at the instance of the Camberwell Vestry for having neglected to comply with a notice served upon him under the provisions of the Metropolis Local Management Acts requiring him to reconstruct the drain of some premises in Trafalgar-road, Camberwell.

Mr. G. W. Marsden, solicitor to the Vestry, appeared in support of the summons, and the defendant was represented by Mr. A. Lincoln Reed, instructed by Mr. H. I. Sydney.

It appeared from the evidence that in the early part of last year the defendant carried out some sanitary work at the premises in question—a public-house—at the instance of the Vestry. Ultimately the Sanitary Inspector required that the drainage of the premises should be reconstructed, a request which the defendant's surveyor considered ought not to have been made, he being of opinion that the drain was sound. The formal notice from the Vestry requiring the reconstruction of the drain was served on the 14th of June last. A few days before that date the defendant had entered into a contract for the sale of the premises, and in July the sale was completed.

At the close of a long hearing Mr. HOPKINS remarked that the action of the Vestry in proceeding against a person who was no longer the owner of the premises seemed to him to be trivial and unnecessary from every point of view. The Vestry seemed to have proceeded because there was a case on their books in which their notice had not been complied with, and without any regard whatever to the facts of the case. The proceedings seemed to be taken not for the purpose of getting the drain put into repair, but for the purpose of getting a penalty from a gentleman who was no longer the tenant of the premises, and who no longer had any power over the drain. If the Vestry said the drain was still defective, they could serve fresh notices upon the new occupier, but no amount of penalties and no amount of hammering at Mr. Huxley could have any effect upon the drain. The defendant would have to pay a penalty of 5s. and 2s. costs.

Notes and Queries.

[Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C.]

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

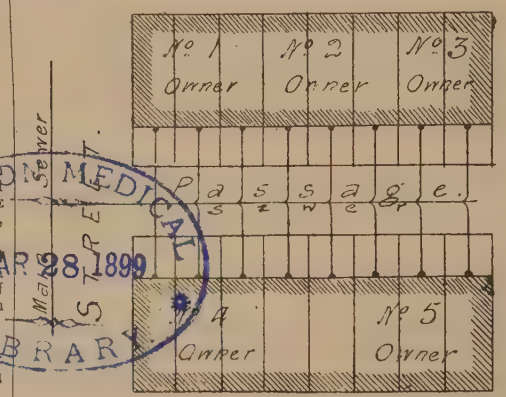
926.—SEWAGE FARMING: VENTILATORS ON SUBSOIL DRAINS.—"T. W. N." writes:—"Will you please inform me if it is necessary to bring up ventilators from subsoil drains in land laid out for sewage irrigation, as shown in sketch. In our sewage works, which for some years have been a source of trouble owing to the impurity of the effluent, these ventilators were fixed as shown. On my appointment a few months ago, I took out all the ventilators except those at the head of the drains, and the effluent showed considerable improvement. The Council, however, have now ordered the ventilators to be replaced. Is not the ventilator at the head of each drain sufficient?"

Answer.—It would have assisted us very materially in advising our correspondent if he had furnished us with a plan drawn to scale, as we are unable to ascertain whether the drains referred to are main subsoil drains or they are tributary subsoil drains; nor can we find from the rough sketch sent us (not reproduced) what was the distance apart at which the ventilators were constructed. On the general question, however, we are of opinion that the ventilators would be detrimental to the successful purification of the sewage, and that, as a matter of fact, the sewage would pass into the joints of the ventilating pipes without undergoing treatment. In stating this we, of course, assume that the pipes used were socketed sanitary pipes with open joints. Assuming, however, on the other hand, that the ventilators were properly constructed with water-tight joints, and placed, say, one chain apart, no advantage would be gained by their use. It is sometimes an advantage to provide a lamp-eye or shaft on the course of the drain, so as to be able to examine whether it continues to do its duty. Apart from this, it is not advisable to provide more than one ventilator, which may be at the head of the drain. Such ventilators are, however, rarely provided by sewerage engineers, as, besides being of doubtful utility, they interfere with the agricultural working of the ground.

927.—MUNICIPAL AND COUNTY ENGINEERS' ASSOCIATION: ADDRESS OF.—"E. A. S." writes:—"Will you please let me know the address of the Institute of Municipal and County Engineers? I am unable to find same in directory. Can you also tell me the charge for syllabus?"

Answer.—The offices of the Incorporated Association of Municipal and County Engineers are at 11, Victoria-street, Westminster, S.W., the secretary of the Association being Mr. Thomas Cole. A copy of the syllabus of examinations will be obtainable free, we believe, on enclosing stamps to defray postage.

928.—DRAIN OR SEWER: VESTING OF SAME.—"Stet" writes:—"I submit sketch showing a number of houses belonging to different owners, the drains of which houses are connected to a main drain laid along the passage or back street. In these circumstances, will the drain be repairable by the owners or by the Local Authority?"



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Answer.—The main drain laid along the passage or back street is a sewer vested in the Local Authority under Secs. 13, 15, and 19 of the Public Health Act, 1875, and it will be their duty to cleanse and keep the same in repair. The provisions of Sec. 19 of the Public Health Acts Amendment Act, 1890, do not apply in the case.

929.—MODEL BYE-LAWS AS TO OFFENSIVE TRADES: HOW OBTAINABLE.—"A. J. B." writes:—"Would you kindly inform me where I may obtain the Model Bye-laws referring to offensive trades and cleansing of footways?"

Answer.—The Model Bye-laws issued by the Local Government Board for the use of Sanitary Authorities, relating to Offensive trades, are published by Knight and Co., price 6d., and those relating to the Cleansing of footways are published also by Knight and Co., price 2d. Copies may be obtained from the Sanitary Publishing Company, postage 1½d. extra.

930.—NUISANCE FROM STANDPIPE: REMEDY.—"Anxious" writes:—"A complaint is received as to a nuisance caused by the water from a standpipe flowing over the ground and causing dampness in the foundations of a house adjoining. In winter the water frequently freezes on the surface of the road, and becomes dangerous to the public. The standpipe belongs to a waterworks company, and was put up with the consent of the adjoining owners. It is not out of repair, and the waste only occurs when pails are rinsed out, and the tap negligently left unstopped. The district is a rural one. (1) Has the Sanitary Authority any powers with respect to nuisances arising from frozen surfaces? (2) Can we compel the waterworks company to remove the standpipe, and fix it in a more suitable situation? (3) Or can we compel them to lay a drain to carry off the waste water?"

Answer.—(1) No; the Sanitary Authority have no

such powers. (2) The Sanitary Authority may suggest to the waterworks company the advisability of removing the standpipe to a more satisfactory situation, but will be unable to compel them to do so. The owner of the premises the foundations of which are injured may institute a claim for damages against the company. (3) If the standpipe is the property of the waterworks company, the Sanitary Authority may by notice require the company to abate the nuisance by providing a sufficient drain to take away the waste water.

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931. — Sewers: Flooding: Compensation. — "D. T. G." writes:—"During recent heavy rains the sewers to which our drains are connected were so flooded as to cause their contents to be backed through our gullies, flooding the basements and cellars of a number of houses to a depth of from 4in. to 12in. Can we recover damages from the Urban District Council? If so, who should proceed, tenant or owner? If not, what steps can we take to prevent the nuisance recurring?"

Answer.—Unless it can be shown that the Urban District Council have been guilty of negligence in the maintenance of the sewer, a claim for damages caused by flooding owing to extraordinary storms could not be substantiated. The duty cast upon Local Authorities by statute as to the making and maintaining of sewers is not an absolute duty, but only a duty to use all reasonable care and diligence to keep the sewers in a proper condition. Assuming that the Local Authority in the case named have been guilty of negligence, a claim for damages may be made by the person who has suffered the damage, which may be either the tenant or the owner, or both. If the Authority are in default in not providing adequate or sufficient sewers, complaint may be made to the Local Government Board under Sec. 299 of the Public Health Act, 1875. It would be advisable, however, to first lay a complaint to the Urban Authority, and on their neglect appeal to the Local Government Board.

932.—Private Streets: Paving Expenses: Service of Notices.—"M. S." writes:—"Notices under Sec. 150 of the Public Health Act, 1875, were served on both the owner and occupier of certain premises abutting on a private street, and, not being complied with, the Council carried out the works. After the apportionment was made, it was found that the property in question had changed hands shortly before the commencement of the works, and that the occupier on whom the notice was served had left the premises at the same time. Do you consider that the service of the notice on the occupier would be sufficient to enable the Council to recover the apportionment from the present owner by taking summary proceedings, or should proceedings be taken to enforce the charge on the property?"

Answer.—Service of notice upon the occupier of the premises previous to the Authority executing the works is sufficient notice to comply with the provisions of Sec. 150 of the Public Health Act, 1875. The Local Authority have the option to serve either owner or occupier, and it is generally advisable to serve the notice upon both the occupier and the reputed owner. In this case notice has been properly served, and the expenses may be recovered summarily from the owner in default. It must be observed that unless notice has been given to the owner or occupier to do the work, the expenses cannot be recovered from the owner.

933.—Practical Sanitary Science Examinations: Syllabus and Books.—"E. H. G." writes:—"I should esteem it a favour if you would give me a synopsis of the subjects of the practical sanitary science examination of the Sanitary Institute, and a list of the books you recommend to be studied for the examination."

Answer.—A copy of the syllabus of subjects for the examination in practical sanitary science may be obtained free on application to the secretary of the Sanitary Institute (Mr. E. White Wallis), Margaret-street, London, W. We regret we are unable in the space at our disposal to publish it in this column. For a list of the books to be studied reference must be made to our answer to Query No. 781, in our issue of September 3rd, 1897.

934.—Destruction of Infected Bedding: Compensation.—"J. H. D." writes:—"We have been served with a magistrate's summons claiming compensation to the amount of 30s. for damages caused by destruction of infected bedding, which had been exposed to infection from a scarlet fever patient. We have not adopted the Infectious Disease (Prevention) Act, 1890. I have advised that, under Sec. 121 of the Public Health Act, 1875, we are not bound to give compensation. I believe the complainant relies on Sec. 308. (1) Has a court of summary jurisdiction power to hear such a claim in face of the option given in Sec. 121? (2) What is your interpretation of the words, 'he is not himself in default,' as in Sec. 308? (3) In case of appeal, will it not be to Quarter Sessions?"

Answer.—(1) Although Sec. 121 of the Public Health Act, 1875, appears to give permissive powers only to grant compensation, we are of opinion that, if a Local Authority, by virtue of its provisions, direct the destruction of any infected bedding or other articles, they are bound to compensate the owner of the articles destroyed. The owner

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of the infected bedding will be able, we are of opinion, to substantiate a claim in respect of the articles destroyed, and the amount of compensation may be determined by justices under Sec. 181. (2) The words referred to apparently apply to cases where, owing to the default of the owner, the Sanitary Authority are compelled to interfere with his property. We do not think the words can be considered to apply in the present case. (3) Yes. See Sec. 269 of the Public Health Act, 1875, and the Summary Jurisdiction Act, 1879, which latter amends and in part repeals Sec. 269 of the Act of 1875.

935.—SEWERAGE OF HOUSES: MODE OF DEALING WITH OLD SEWER.—"J. F. M." writes:—"(1) I enclose sketch plan showing six pairs of semi-detached villas, the sewer to which is so defective as to require entirely relaying. In providing a new sewer, would you consider a sewer of 6in. diameter to be of sufficient capacity, or would you advise the provision of a 9in. sewer? The surface-water from roof, &c., is to be taken into the new sewer. (2) The defective sewer runs under coal-houses with cement floors and cemented yard surfaces, and is a 9in. pipe. How should it be dealt with? It would be very costly to take it up. (3) The disconnecting traps for drains are not in the right place, as a branch drain from a w.c. joins the main drain from each house at a point nearer the sewer than the trap. Can we legally compel the owners to continue their drains to the new sewer and put the disconnecting traps in the proper place, whether the drains are otherwise defective or not?"

Answer.—(1) We advise that a sewer of 9in. diameter be laid under the circumstances named. (2) The old sewer should be disinfected, flushed, and cleansed and blocked up at each end with cement concrete. As it will be broken into in different parts of its length, for the purpose of disconnecting the individual house drains, the openings thus made should be similarly plugged with cement concrete, so as to prevent as far as possible its becoming infested with vermin, such as rats, &c. The old sewer, if so treated, need not be taken up. (3) We should advise that the Authority require the owners, under Sec. 23 of the Public Health Act, 1875, to provide sufficient drains to each house, and for that purpose to take up and relay the disconnecting trap at a point below the lowest junction of each branch drain with the main drain.

TO OUR READERS.

The Editor solicits the co-operation of readers in making THE SANITARY RECORD *more attractiv by means of pen-and-ink sketches, photographs, and diagrams. There are many phases of sanitary work which lend themselves admirably to illustration. By this means not only individual articles, but the journal as a whole will be heightened.*

Contracts Open.

The dates given below are the latest up to which tenders can be received.

GLASGOW, January 17th. — Sewer. — The District Sanitary Office, 28, Cochrane-street, Glasgow.

MAIDENHEAD, January 17th.—Drainage.—Mr. Percy Johns, A.M.I.C.E., borough surveyor, Guildhall, Maidenhead.

BRIDGWATER, January 18th.—Sewer Work, &c.—Mr. Wm. Coles, Council's inspector, 2, Grosvenor-villa, Wembdon-road, Bridgwater.

LIMERICK, January 18th.—W.C.'s and Drains.—Mr. W. E. Corbett, C.E., M.R.I.A.I., city surveyor, 28, Glentworth-street, Limerick.

BIRKENHEAD, January 19th. — Sewer, &c. — Mr. Charles Brownridge, A.M.I.C.E., borough engineer and surveyor, Town Hall, Birkenhead.

HURST (LANCS.), January 20th.—Drainage Works.—Mr. Edward Garside, A.M.I.C.E., Town Hall-chambers, Ashton-under-Lyne.

LONDON, N.W., January 24th.—Works and Materials.—Mr. S. Slater, Public Offices, Hendon.

LONDON, N., January 25th.—Sewers.—Mr. P. E. Murphy, engineer to the Council, Coombes Croft House, 712, High-road, Tottenham.

LONDON, S.E., January 25th.—Sewer.—The Engineer's Department, County Hall, Spring-gardens, S.W.

MIDDLETON (LANCS.), January 26th. — Sewerage Works.—Mr. H. Leonard Hinnell, M.I.C.E. (Hinnell and Murphy, C.E.), 41, Corporation-street, Manchester.

KEIGHLEY, January 31st. — Sewers, &c. — Messrs. Barber, Hopkinson, and Co., civil engineers and surveyors, Craven Bank-chambers, Keighley.

Vacancies.

CLERK OF WORKS (SOUTHAMPTON, January 17th).—For the Harbour Board. Salary £2 2s. per week. Mr. A. H. Skelton, clerk, Harbour Board Offices, Town Quay, Southampton.

DRAUGHTSMAN (GOLD COAST, January 17th).—For Public Works Department, Gold Coast, West Coast of Africa. Salary £250 per annum for first eighteen months, £275 for the next eighteen months, £300 for any further period for which he may be engaged. Crown Agents for the Colonies, Downing-street, London, S.W.

DRAUGHTSMAN, &c. (HARTLEPOOL, January 20th).—Salary £2 2s. per week. Mr. H. C. Crummack, A.M.I.C.E., borough engineer, Town Hall, Hartlepool.

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For literature see "THE THERAPIST," November, 1897, and January, 1898.

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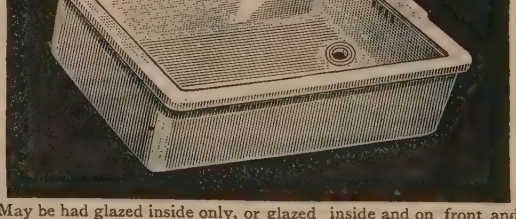

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THE
Sanitary Record,
JANUARY 21, 1898.

Notes.

IT is a serious matter to consider that that grim scourge, tuberculosis, is practically a new disease among cattle, for it enforces attention to the fact that, despite the earnest efforts that are being made to eradicate it, the malady has assumed its present alarming proportions within a comparatively short space of time. The author of a pamphlet on "Bovine Tuberculosis," which has just been published, looking back thirty-five or forty years, states that tuberculosis was then an unknown disease. There were, no doubt, "piners" and "wasters" among cattle, but tuberculosis, as we know it now, at that time practically did not exist. We may well pause over these considerations, for they compel us to institute comparisons with the dimensions attained by the disease at the present day; and though accurate figures are not available, and the estimates of the number of cattle affected vary within the widest limits, even at the lowest computation, the numbers are such as to give cause for the gravest apprehension.

OF course, it is possible to exaggerate the danger. We are far from being threatened with national disaster, as is the case in South Africa with regard to the rinderpest, or the public would soon wake up. As a matter of fact, the public are singularly apathetic, because no amount of theorising or pointing out possible sources of danger will touch them until they see proofs of the evil actually in their midst. But if this same public were to lay to heart the facts and the figures which have been irrefutably established by "men who know," they would be provided with material for serious thought. Here is one fact for instance, which is emphasised by Mr. Warnock, the author of the pamphlet to which we have referred, and which may be taken by way of illustration of the conditions which favour the spread of the disease. In our larger towns, he points out, while much of our milk supply is drawn from the country, a very large proportion of it comes from exclusively city dairies, where the cows, though tended no doubt with care, must inevitably suffer from their confined existence. Deprived of the health-giving pastures which are their natural sphere, and of the fresh air and sunshine which are the only sure preventives of tuberculosis, such animals must deteriorate in the long run; and consequently it is small wonder that from 20 to 70 per cent., according to varying estimates, of the stall-fed cows in our towns are infected with tuberculosis.

A MORE serious charge, if true, is that the infected carcases are not infrequently disposed of in city markets, which are conducted under the very auspices of the Local Authorities, whose duty it is to supervise the supply of butchers' meat. We have no doubt that there must be a good deal more laxity of practice in this respect than is usually suspected, though to what extent it would be hard to say; but the very suspicion of such a thing should lead to increased vigilance on the part of all sanitary officials, whose part it is to check such looseness, when known to exist. Of course, that is a state of things that would be stopped at once, if detected, by a conscientious public servant; but the other evil, the system of deriving the milk supplies of a large city from stall-fed cows, is one that is open and recognised, and it is time that steps should be taken to have it also done away with. It is practically hopeless to expect immunity from infection from supplies drawn from such sources, and the question is too serious to be shirked.

THE water supply of Alloa is drawn from a dam, the proprietor's rights over which were acquired by

the town some time since for a considerable sum. The waterworks were also enlarged and improved at a cost of about £30,000. Notwithstanding this lavish expenditure, the water supply of the place has been seriously endangered by the opening of a coal pit in the vicinity, the sewage of which, after a process of nominal purification, has been allowed to pass into the dam. The Authorities recently obtained the report of an analyst, which showed that the samples submitted to him were quite unfit for domestic use, as they contained a large amount of suspended matter. Two alternative schemes have now been proposed to remedy the evil; either to provide an additional settling tank for the purification of the sewage from the pit, or to lay a pipe whereby the sewage might be diverted to a stream some two miles off, instead of being allowed to pass into the dam at all. To us it certainly seems extraordinary that the scourings of a coal pit should, under any circumstances whatever, be allowed to enter the reservoir from which the town's water is drawn, for even with the most carefully-devised settling tanks the purity of the water supply will always be liable to pollution from this cause. We presume that the colliery must possess rights in the dam which are indefeasible; otherwise it is hardly credible that their commercial interests should be suffered to jeopardise the health of the inhabitants.

While on the subject of water supply, we note with interest the report of an action at the instance of the Western District Committee of the County Council of Haddington against the proprietor of the village of East Saltoun, to compel him to provide an adequate vater supply for the villagers. It seems that there were two wells in the village, one of which was closed some time ago, as the water was found to be unfit for domestic use. The other well was still suitable, but was practically unavailable for many of the inhabitants on account of its distance from their houses. The proprietor, anxious to discharge his responsibilities, had borings taken, with a view to providing a permanent supply for these houses, but without success. He then made arrangements for a cart being taken daily, with a large barrel or puncheon, filled from the only available well, to a convenient spot where the houses to be supplied could satisfy their requirements, the barrel being refilled whenever emptied. Was this a sufficient provision in the eyes of the law?

The Court has decided that, while the Local Authority was quite entitled to call upon the proprietor to provide the inhabitants of his houses with a proper water supply, he had done all that could be required of him in the circumstances. The arrangements adopted by him were certainly rather primitive; but it was not disputed that the water provided in the puncheon was both wholesome and sufficient for the simple needs of the few villagers for whose benefit it was designed. The Public Health Act, under which the proceedings were taken, did not specify the mode of supply; it was enough to satisfy the provisions of the statute if a sufficient supply of good water was brought within convenient distance of the houses. Neither was it averred that the owner was likely to discontinue the supply; on the contrary, he appeared to be anxious to discharge his obligation, the nature of which had to be considered in the light of the circumstances of the place. So the puncheon will continue its daily peregrinations, till nature provides a more efficient substitute.

It seems a new idea to seek light for the cure of drunkenness from the ancient world. Apparently, however, even in this matter, we have lessons to learn from the long-forgotten past. A lecture was delivered the other evening by Dr. W. L. Brown before the Society for the Study of Inebriety, on "Inebriety and its Cures among the Ancients," in the course of which the lecturer reviewed the social customs of ancient Egypt, Assyria, Babylon, and the early Saxons, illustrated with diagrams, and discussed the remedies adopted by the physicians of those far-off times to prevent the evil effects of drink. The result of these researches was to show that the ancients were much more successful in their "cures" than we have been in ours, and the curious thing is that "total abstinence" formed no part of their system. Verily, we do not grow wiser with the centuries!

We have received from Mr. Callison, the Superintendent of the Cleansing Department of the City of Manchester, a very interesting report of the work done during the year 1896—7 by that department. As our readers are doubtless aware, refuse destructors are in use in that city; and in order to avoid the expense of carting away the clinkers they are ground, mixed with lime, and made into mortar, with the result that a profit was earned during the year under review of no less a sum than £1678 18s. 11d. This example might be followed in other towns, and is another proof of the repeated assertion that there is a use for everything, if only we find it.

It also appears that the department has been successful in another direction, viz., the farm; and we quote from the report the following paragraph, which is indeed, as the Committee say, "satisfactory:"—"With regard to the Carrington Farm account, the land farmed by your Committee consists of about 400 acres, and the amount charged to the farm for rent during the year was £933 1s.; all other expenses in connection with the farm at Carrington have been debited to the farm account, and credit has been given for all revenue derived purely from the farm. It is satisfactory to note that a profit has been made upon the farming operations."

On Sunday night there passed away one of the men of the century. To many the Right Hon. Charles Pelham Villiers was only known as the "Father of the House of Commons," but to those whose memory goes back half a century, he was a central figure in a small circle of earnest reformers. With his politics we have no concern, but it is interesting to note that he was the first President of the Poor Law Board in Lord Palmerston's administration, the post carrying with it a seat in the Cabinet. His strong personality found full scope for exercise in this important office, and his contemporaries tell us that when he vacated the post, he not only had left his mark on Poor Law legislation, but he had earned such praises from the poor that would have made his reputation even if

he had never been associated with any other reforms. For the great services of his early days Wolverhampton retained him as a member long after he desired to be released from the cares of parliamentary duties.

The plague still continues its dreadful ravages in India. The number of deaths reported at Bombay last week was 450. The total mortality of the city showed a death-rate of 81·18 per thousand. This week a statement has been issued by the Authorities at home, to which we gladly give circulation. It states that some months ago reinforcements of doctors and nurses were sent to India for temporary plague work. The Indian Government has now telegraphed to the Secretary of State for eight more doctors, two more lady doctors, and twenty-five more lady nurses. The Viceroy adds that, if the plague should extend, more men and women doctors and more nurses will be required. The India-office has already on its lists the names of a certain number of volunteers, all of whom are ready to start at two or three days' notice. We are asked to state that the India-office invite other volunteers to send in their names in case further help is wanted at short notice. None but candidates possessing full medical or nursing qualifications can be accepted, and no volunteers are sent to India until they are found by the Medical Board to be fit for tropical service. The terms of appointment and other information will be sent to any qualified person who may apply to the Revenue Secretary, India-office, Whitehall, S.W.

The reports of the Medical Officers of seaside towns are always interesting, and we are not surprised that general satisfaction has been caused by the presentation of an interim report from Dr. Newsholme, Medical Officer of Health for Brighton, announcing that the mortality returns for the past year have fallen to the lowest point ever reached in the borough. Dr. Newsholme, in a letter to the Sanitary Committee, writes that as it will be a considerable time before his Annual Report can be issued, he thinks it will be of interest to state that the death-rate of Brighton—the municipal borough—during the year 1897 was at the rate of 15·0 per 1000 inhabitants. The lowest rate previously reached was 16·1 in 1896 and 1889. He adds: "The favourable climatic conditions of 1897 have undoubtedly helped in producing the above favourable result; but, when due allowance is made for this, a death-rate of 15 per 1000 is extremely satisfactory, especially when it is remembered that the municipal borough of Brighton has not the usual complement of suburbs within its borders, which must always have a lower death-rate than the more central parts of the towns, and that in this respect Brighton is handicapped from a statistical standpoint in comparison with other great towns."

Some interesting figures were given by Sir Alexander Binnie, on Monday last, before the Royal Commission appointed to inquire into the supply of water to London. Sir Alexander said he had devoted many years to the question of London water supply, and to the various schemes which had been brought forward from time to time. There were eight water companies in London, and in 1896 another body was formed under the Staines Reservoirs Act. The area of the Administrative County of London was 121 square miles. The population in 1861 was 2,808,862; in 1871 it was 3,266,987; in 1881 the figures were 3,834,194; in 1891 the population was 4,232,118; and in 1896 it was 4,413,118. Taking the whole metropolitan police area, the population in 1861 was 3,222,720; in 1871, 3,885,641; in 1881, 4,766,661; and in 1891, 5,633,806. From these figures he found that the population of the outer ring, which between 1861 and 1871 increased 49·5 per cent., and between 1871 and 1881 at the rate of 50·7 per cent., and increased between 1881 and 1891 at the rate of only 50·3; so that the whole population within the outer ring was increasing at a decreasing ratio. Water London contained 620 square miles, of which 426 were within and 144 without the area of Greater London.

Another point brought out was the strength of the monopoly of the present companies, and the vastness of the area occupied. We were told that the Southwark and Vauxhall Company had a total parliamentary area of 50½ square miles, of which 39½ were within the County of London, and 11 square miles without, and it was overlapped by the parliamentary area of the West Middlesex Company 17½ miles, by the Lambeth 41 miles, the Kent Company 7½ miles, and the Richmond Corporation two square miles. Within the Southwark area Lambeth supplied 19 square miles, and within the Kent Company's area 3½ square miles. Witness gave similar details respecting each of the companies, explaining that overlapping did not mean competition. The Lambeth Company had 104 square miles, of which 42 were within and 62 without London County area; Kent Company, 212 square miles, of which 38 were within and 174 without the County of London; East London, 139 square miles, 21 within and 118 without, and partially overlapped by the South Essex Company; the New River Company, 107 square miles, 25 within and 82 without; West Middlesex, 85 miles, 34 within and 51 without; the Grand Junction, 52½ miles, of which 31½ were within and 39 without; and the Chelsea Company, with 20½ square miles entirely within the County of London. There was, witness explained, actual competition between the Grand Junction and the West Middlesex Companies. Taking the figures in the aggregate the united companies had power to supply 770½ square miles, or 150 square miles more than the total area. The competition was only on 2½ square miles out of 620. The total population was 5,606,920 persons, and the quantity supplied 197,988,052 gallons, of which 79¼ per cent. was supplied within the London County, and 20¾ per cent. outside.

TO OUR READERS.

The Editor solicits the co-operation of readers in making The Sanitary Record *more attractive by means of pen-and-ink sketches, photographs, and diagrams. There are many phases of sanitary work which lend themselves admirably to illustration. By this means not only individual articles, but the journal as a whole will be heightened.*

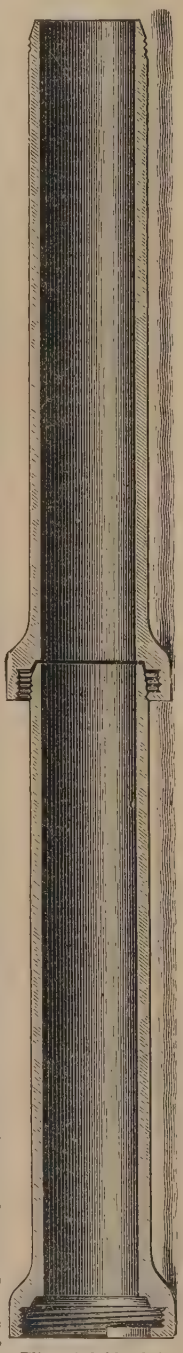
THE SANITATION OF DOMESTIC BUILDINGS.

By Frank Latham, C.E., M. San. Inst., &c., Assistant Surveyor, Borough of Margate.

CHAPTER II. (*continued*).

A variety of joints have been patented, and there is, as a rule, little or no fault to find with them, some of these recognised as successful being as follows:—

Fitzpatrick's patent joint is made as an improvement on the ordinary method of jointing pipes, and to dispense with the use of gasket, which in the usual joints is first placed between the spigot and socket, for the purpose of securing a uniform level in the pipes and preventing the cement entering and causing an obstruction. This joint is made by bevelling off the end of the spigot, a corresponding bevel and shoulder being formed at the back of the socket, giving a perfect continuity of bore, without the use of gasket. The joint is then finished in cement, and the liability of any of the material finding its way into the inside of the drain is reduced to a minimum. (Fig. A.)



Fitzpatrick's Joint

Hassall's "Double-lined" joint has a composite material cast on the spigot and socket; when the pipes are pushed together grout cement is run into an opening provided in the socket for that purpose. The grout cement then runs all round a groove left between spigot and socket, and makes a tight joint. (Fig. B.) Sykes' patent is a joint manufactured by the Albion Clay Company, Limited, and is on the principle of a screw which is cast on the spigot and in the socket in composite, and when well tightened together cement can be used in the space remaining to further secure the joint. (Fig. C.) Green's patent "Truinvert" pipe is a joint on the Hassall system, and when properly made affords an unusually safe and strong joint for house drainage purposes. It is formed, in the first place, by a lengthened double socket, one socket being deeper than the other, for the reception of the Hassall or composite joint, while the other forms a rest or seating for the end of the spigot. The pipes being thus placed together, a chamber is left between the composite and the end of the first socket for cement or other grout, which is admitted through two holes at the top of the sockets. (Fig. D.)

Self-adjusting joints, although not so extensively used for house drainage, are invaluable in some cases, and almost indispensable for laying drains in water-logged ground, as the work can be satisfactorily completed under water. The principal of these

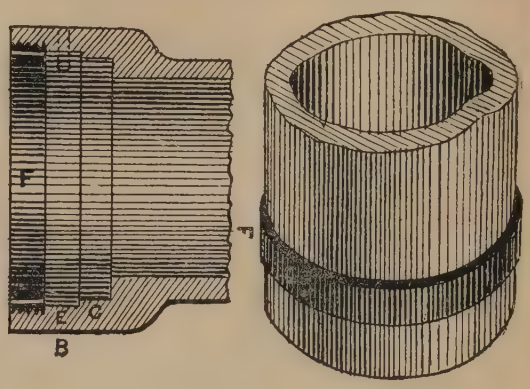


Fig. A

are Doulton's patent self-adjusting joint, which consists of a composite casting of spherical form on the spigot, and a lining of the same material in the socket, so that the spigot works in the socket on the ball-and-socket principle, and thus the joint is not injured by settlement of the ground. No cement is required.

The spigot and socket have only to be pushed tightly together and the joint is complete, consequently the pipes can be much more rapidly laid than in the case of hand-made joints. A little grease is sometimes used round the socket and spigot, in order that they may slip together easily. (Fig. E.) Messrs. Doulton have further improved this joint for house drains by their patent "composite" joint, which is laid and jointed in the same manner as their "adjusting" joint, but the sockets are of extra depth, leaving a space for the reception of an outer joint to be made in cement in precisely the same manner as an ordinary socketed joint, the composite taking the place of gasket. (Fig. F.) The material known as composite forming the principal feature of the Hassall and most patent joints, consists of sulphur, sand, and tar, in the proportions of 4, 2, and 1 respectively, which are mixed

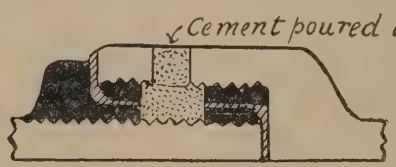


Fig. B

together while hot and moulded on to the spigots and sockets while the pipes stand in vertical position.

In iron pipes the joints should be made by first driving rings of twisted gasket or hemp into the sockets till they are half filled; cold rings of drawn lead is sometimes used in preference to gasket, but as hot lead is liable to melt these rings, the method is not to be recommended. Melted lead is then run in and the whole caulked up, and at the finish the joint should be full of lead. Great care should be taken that no lead gains access into the interior of

the pipes. The melted lead is run into the joints of small pipes by means of a fillet of clay being formed between the end of collar of the one pipe and the barrel of the other, leaving the cavity

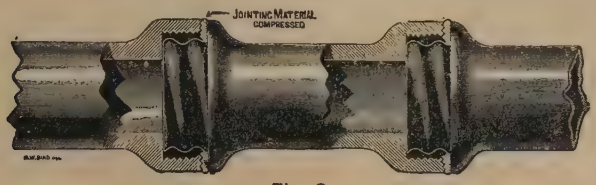


Fig. C

between the spigot and socket free for the lead to run round. For large pipes, in the place of the fillet of clay, which would not stand in making a large joint, gasket is twisted together, and after being dipped in puddled clay is fastened tightly round the pipe, and pushed against the collar to form a fillet, as in the former case.

The cement used for drainage works should be of the best Portland, finely ground, and weighing 112 lb. to the struck bushel, breaking with a weight of not less than 250 lb. per square inch after seven days' immersion in water. All cement for drain joints should be mixed up and allowed to stand awhile before use. If not so treated the cement is likely to blow. At the same time it should not be worked up a second time. In practice, it will be found that the addition of a small quantity of clean, sharp sand, used with discretion with the cement is beneficial, as the joints are not so likely to crack as when made with neat cement. The writer has had cases where, after drains have been satisfactorily laid, the joints on becoming set have blown and cracked owing to the heat of the cement, and thus rendering the drain defective.

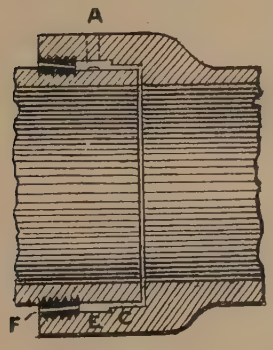


Fig. D

Concrete for drainage works should be composed of one part Portland cement well mixed while dry with six parts of good, sharp, clean gravel, or Thames ballast, the stones not to be larger any way than will pass through a 2in. ring, and to have a proportion of sand or fine gravel which will only just fill in the interstices of the large materials.

Often it is found necessary to carry a drain over an old filled-up cesspool of which the crown has been removed; unless proper precautions are taken, upon the ground subsiding the drain will be fractured. To prevent this it should be carried over the treacherous spot either by replacing the crown at the level required, or by bridging with a strong stone flag or iron girder with good bearings on each side. If possible, however, it is better to avoid such treacherous spots. The method of laying drains embedded with concrete is somewhat the same as already described. On the floor of the trench 6in. of good concrete should be laid, about 18in. in width. The pipes are then laid before the concrete becomes set, and the sockets sunk till the barrels rest firmly on the bed. The joints are then made in the same manner as before, and allowed to set, and, after testing any space between the pipes and concrete floor, which had been necessarily removed for jointing purposes, should be carefully filled in with concrete, which should then be brought round 6in. in thickness till the drain is perfectly surrounded. When this operation is completed it is advisable to again test the drain, in order to be assured that no fracture of either joints or pipes has taken place.

When the drain is more than 10ft. in the ground,

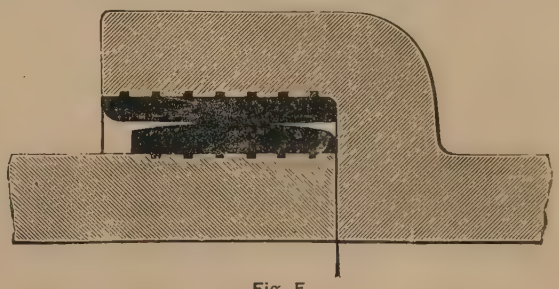


Fig. E

special provision should be made against the crushing of the stoneware pipes by compression from the superincumbent material. This can be done by using pipes made for the purpose, which are stronger than ordinary ones, being one-tenth the diameter in thickness. Should pipes of ordinary thickness be used they should have extra support by being laid in a bed of concrete brought half way up the sides, and in some cases surrounded with this material. It should be borne in mind that drains under houses should be laid in perfectly straight and direct lines, and with uniform falls from one end to the other. Thus assuming the pipes to be faultless and joints carefully made, the tube will be true and free from those defects which might tend to check the free flow of its contents, and thus safeguard against stoppages or fouling. As a matter of fact, all drains, including those outside of houses, should be laid in as straight and direct lines as practicable. With regard to the fall of house drains, it is advisable to have an inclination that will give a self-cleansing velocity to the sewage of 4ft. per second. A fall of 1 in 70 to a

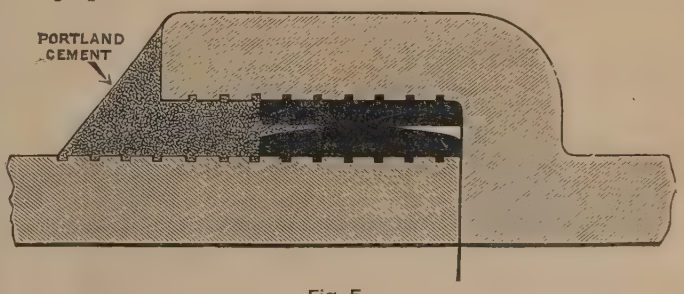


Fig. F

6in. drain, and of 1 in 50 to a 4in. drain, will effect this, when running full or half full. It is true that

a less fall is sometimes given, even up to 1 in 120 for 6in., and 1 in 80 for 4in. drains, giving a velocity of 3ft. per second, which by some authorities is considered sufficient, but the sharper fall is preferable, and lends itself better for ventilation purposes.

The determining the size of the pipe for house drains requires some consideration, there being as much hazard in making it too large as too small. Four-inch pipes should be the minimum size used, and it is quite sufficient to drain any fairly-sized house; they would scarcely ever run full, and are much more self-cleansing, and less likely to block than 6in. with the same quantity of sewage passing through. A drain running half-full bore is less likely to become blocked than one running less than half-full. This is owing to the fact that the deeper the water runs in a drain the quicker is its velocity, and quicker velocity means greater cleansing effect. The sectional area of a 4in. pipe is less than half that of a 6in., and therefore a 6in. drain would hold more than double that of a 4in. of the same length. A 6in. drain with a fall of 1 in 70 when running half full is capable of discharging 150 gallons of sewage in one minute, and with a fall of 1 in 120, 115 gallons. A 4in. drain with a fall of 1 in 50 will discharge 65 gallons per minute when running half full, and 50 gallons per minute with a fall of 1 in 80. When running full the discharge would be double. From the foregoing it will be seen that a 4in. pipe is more self-cleansing for ordinary houses than a 6in., besides not offering so much space for the collection of drain air or gas, nor surfaces for the deposit of filth to foul the drain. Drains 6in. in diameter should only be adopted under special circumstances for large establishments.

In order to set out the fall of a drain, the mason's spirit level and long straight edge are, as a rule, used. The spirit level should be placed on the straight edge, and this being laid on the top of the sockets of the pipes it should be raised at the lower end till horizontal. Then the measurement between the lower side of the straight edge and top of socket of pipe will represent the fall, and the length from the socket on which the other end of the rod rests to this point will represent the distance, and the one divided into the other will give the inclination. A convenient way is to fix a small cube of wood representing the fall required in a given length to the lower end of the straight edge. It is a mistake to merely lay the level on the barrel of the pipes, which is often done to obtain approximate falls without using a straight edge, as no uniformity of inclination can thereby be obtained.

A STRANGE ANOMALY.

Dr. T. Orme Dudfield, Medical Officer of Health, Kensington, in his annual summary, refers to a specially unhealthy area, known as Notting Dale, and emphasises the result of the strange anomaly which gives to the smallest of Local Urban Authorities powers denied to London Sanitary Authorities.

"The statistical information relating to the Notting Dale special area is summarised below, the relative figures for 1896 being also given by way of comparison. The population in 1896 was 3740; in 1897 it was ascertained to be 4000.

	1896	1897	
Births	142	... 130	
Birth-rate	38·0	... 32·5	per 1000 living.
Deaths	187	... 223	
Death-rate	50·0	... 55·7	per 1000 living.
Infantile death-rate ...	432	... 431	per 1000 births.
Zymotic death-rate ...	8·0	... 6·3*	per 1000 living.

"It has to be said, and it is said with regret, that no improvement in regard to the healthiness of the district, as judged by the death-rate, is as yet manifest, notwithstanding the efforts made in 1897 to improve the sanitary state of the houses and their surroundings. Nor is much change for the better, if any, to be expected until means shall have been devised to secure amelioration in the conditions of the home life of the people. It was hoped that this would have been brought about by the action of the County Council, to whom application was made by your Vestry that they should acquire the houses on the special area, under Part III. of the Housing of the Working Classes Act, 1890, and so be enabled to provide healthy homes for the inhabitants, whose tenancy could thus have been made subject to stringent regulations, as provided for in the Act. But this hope has been dissipated; the Council not having seen their way to undertake the beneficent task proposed to them. Your Vestry have, at present, no power to put this part of the Act into operation; it only remains, therefore, if anything is to be attempted, that steps should be taken to promote legislation to make the Sanitary Authority the Local Authority, sole or concurrent under Part III. It was a legislative mistake to endue the Council with exclusive power, and the sooner the mistake is rectified the better. It is a strange anomaly that the Sanitary Authorities of the metropolis should be denied powers enjoyed by the most insignificant Urban Sanitary Authority without London. Surely it cannot be supposed any Vestry or District Board would be unwilling to search out its dark places, and apply what appears to be the only remedy for such a state of things as exists in the special area, and probably in many another spot in this great city. It has been said more than once in these reports that the money cost of improved housing of the poor (if any) would be small in comparison with the good effected: such as has been effected—to cite but one, a notable instance—at Glasgow, where municipal lodging-houses for the dregs of the population, the outcasts of society, have been provided; the means of a comfortable, homely, and a social life, of a sort, being there secured to these poor creatures at a reasonable outlay for lodging and other accommodation, and this without entailing any burden upon the ratepayers."

We commend the above to the earnest consideration of all interested in the sanitary condition of the metropolis, and invite our readers to use our correspondence columns for the purpose of giving expression to their views.

East Grinstead.—The opening ceremony of the sanatorium took place on Thursday the 6th inst.

* The rate in 1896 was three times as great as that of the parish as a whole; the rate in 1897 was rather more than 3½ times as great.

NOTES ON
PRACTICAL SANITARY SCIENCE.

By WILLIAM H. MAXWELL.

Assistant Engineer and Surveyor, Leyton Urban District Council, Author of "Drainage Work and Sanitary Fittings," "Ventilation, Heating, and Lighting," &c., Certificates of the Association of Municipal and County Engineers, and Sanitary Institute.

No. 43.—REFUSE DESTRUCTORS.

(Continued from page 35.)

Whiley's Destructor.

This machine, shown in section in Fig. 7, is the patent[112] of Mr. Henry Whiley, the superintendent of the Scavenging Department of the Manchester Corporation, and is designed primarily with a view to labour saving. The arrangement differs from others in that there is no drying hearth, the refuse falling directly through hoppers to the furnace bars. A trough or hopper is provided at the back, into which the carts tip direct. A spout or tube is arranged, through which the refuse falls on to movable excentric grate bars, similar to Vicar's patent grate bars. These bars automatically traverse the refuse forward in the furnace, and finally push it against a flap door, which opens and allows it to fall out. The important difference between this furnace and others, therefore, is its automatic action, which aims at the reduction of manual labour to a minimum—the cells being fed, stoked, and clinkered automatically as above described.

A means of changing the speed of the bars from time to time is provided by friction gearing, in which the driven wheel running on the face of the driving disc, can be moved nearer to or further from the centre of the disc, which revolves at a constant speed. Some trouble has been experienced from the refuse sticking in the hopper, but no doubt that will be overcome. A more serious drawback to the system is that the grate bars have so much motion that they would let fine refuse drop through unburnt, and are therefore only suitable for places where, as at Manchester, they *screen* all the refuse, or at least select it. Exception may be taken to the mode of pushing out the clinker, as it causes the door to be continually flapping so that it fans cold air into the furnace. At the same time it is only fair to say that with screened Manchester refuse a very fair temperature, said to be about 1000 deg. Fah., is maintained, and the amount burnt is claimed to be ten tons per cell per day. Forced draught is employed by means of a Roots' blower.

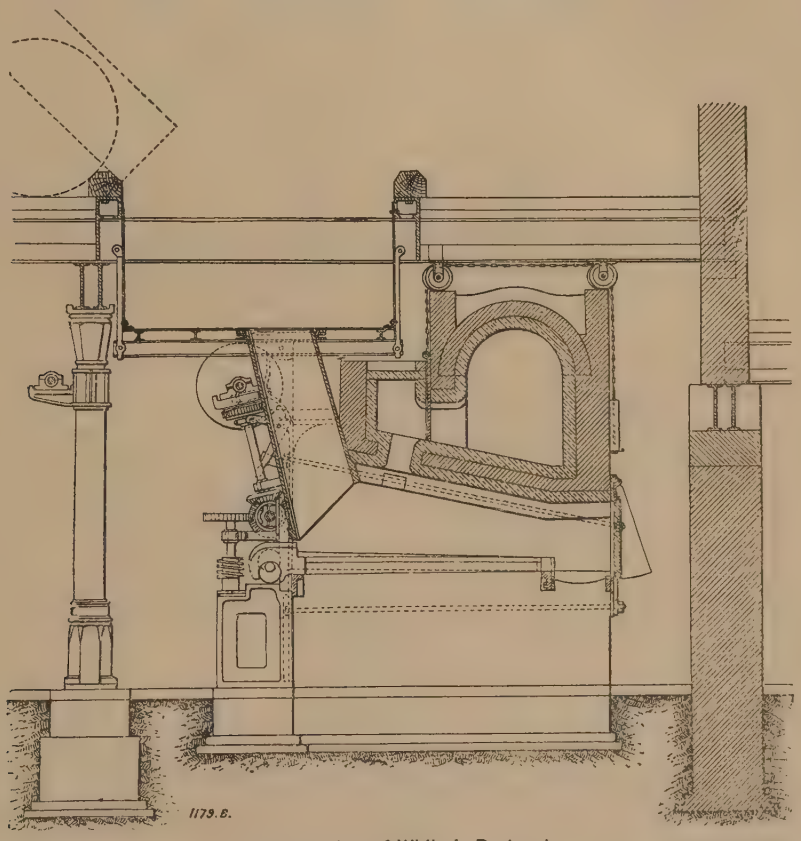


Fig. 7—Section of Whiley's Destructor

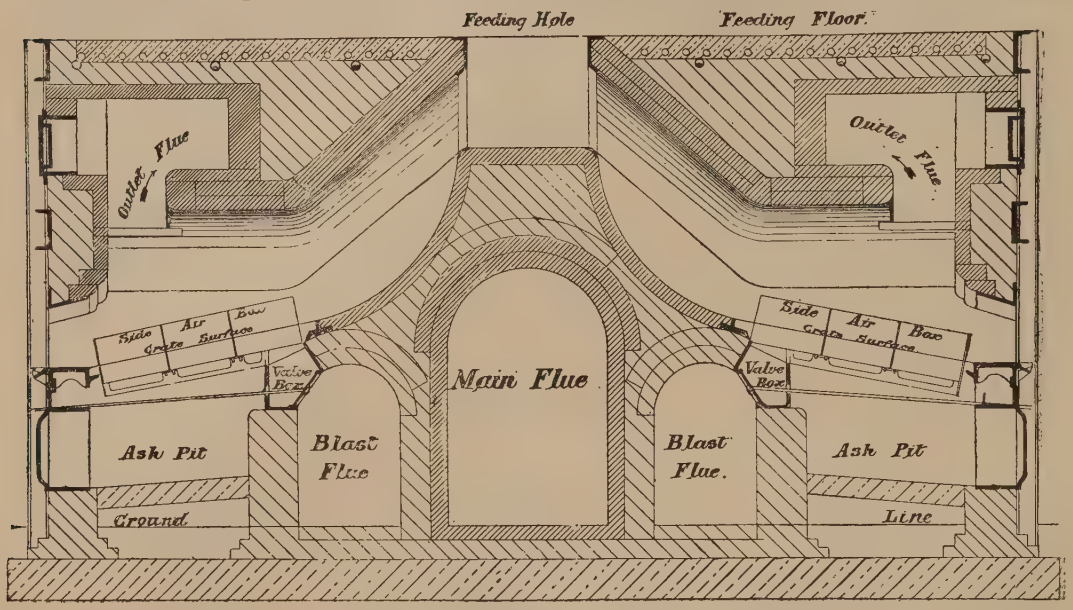
It will be noticed from the figure that the outlet into the main flue for the products of combustion is close to the shoot for the crude refuse — an arrangement which facilitates the escape of the objectionable empyreumatic[113] vapours unless the

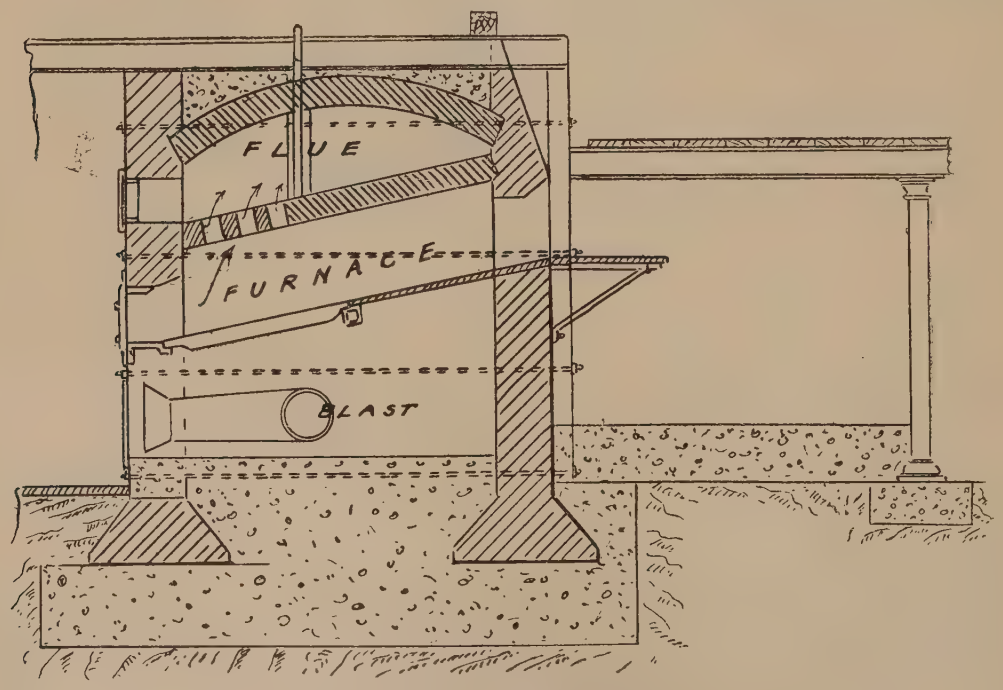
[112] Patent No. 8271, A.D. 1891.

[113] *Empyreumatic* = pertaining to the peculiar smell and taste arising from products of decomposition of animal or vegetable substances when burnt in close vessels.

heat of the flues can be maintained at a temperature sufficient to effect their decomposition and render them innocuous.[114]

The Manchester Corporation have laid down a perature" destructor adopted, either in whole or in part, at Oldham, Leeds, Bradford, Heckmondwike, Nottingham, Salford, Blackpool, Blaby, Calcutta, Berlin, Hamburg, and Edinburgh. It will be seen





Figs. 8 and 9—Horsfall's Destructor.

large installation of this form of furnace after having given it an extended trial.

Horsfall's Destructor.

The Horsfall refuse furnace[115] is a "high tem-

from the section (Fig. 8) given herewith that, although the general features of Fryer's destructor are retained, the details of the furnace differ from those previously described. This is particularly noticeable in regard to the arrangement and position of the outlets for the products of combustion, and in the introduction of a blast flue which forces air into a closed ashpit.

[114] It has been ascertained that a temperature of about 1250 deg. is required for this.

[115] Patent No. 8999 (1887); No. 14,709 (1888); and No. 22,731 (1891)

Speaking generally, the destructor consists of a furnace somewhat similar in dimensions and shape to Fryer's, with sloping drying floor and grates, bricked walls protected by cast iron side plates, perforated fire-brick arched roof, side flues, and an enclosed ashpit. The grate, which is composed of mechanical self-clinkering grate bars, is a little over 5ft. square, and at the back of this in the older forms is the drying floor of about 20 square feet in area, which in Horsfall's "improved design" is replaced by a "patent self-feeding apparatus"[116] worked by eccentric gear.

The accompanying diagram—Fig. 9—illustrates in section the destructor as originally designed by Mr. W. Horsfall, of Leeds, and a destructor of this description is in use at Oldham. The charging opening is situated in the back wall of the furnace, through which the refuse is thrown and distributed as required over the fire-grate and drying hearth.

PUBLIC HEALTH PROGRESS IN THE QUEEN'S REIGN (1837—1897).*

By T. RIDLEY BAILEY, M.D., of Bilston.

(*Continued from page* 40.)

TYPHUS FEVER.

Until the year 1869, typhus, typhoid, and simple continued fevers were included in the Registrar-General's returns under the one heading "Fever." Long before that time, however, it had been recognised that this term embraced different diseases which had been previously regarded as merely stages of the same affection.

In 1840 the late Dr. A. P. Stewart pointed out, in the *Edinburgh Medical and Surgical Journal*, the chief characteristics of typhus and typhoid fever, and showed that not only the symptoms but also the method of propagation, the class of persons mostly affected, the duration of the attack, and the mortality, were quite distinct.

These differences were not generally admitted till 1850, when Sir William Jenner, as a result of his inquiries, showed that the etiology of the one was not that of the other, that the two diseases only rarely prevailed together, and that the one did not communicate the other.

The importance of this discovery cannot be overestimated. It is most essential in preventive as in curative medicine that the correct diagnosis and the exact cause of every disease, but more particularly the contagia, should be definitely known in order that the proper steps may be taken to prevent their spread.

From 1870 the deaths from "Fever," therefore, have been classified under the headings, typhus, typhoid, and simple continued fever, but before that time no distinction is possible. Typhus fever or the old putrid, jail or hospital fever, is eminently infectious, and, as is now well known, is associated with overcrowding, dirt, want of light and air, and destitution.

In 1837, the disease prevailed in many parts of England, and in 1838 no less than 1271 per million of the population died of it. In the years 1846—48 a frightful epidemic occurred in Ireland on the failure of the potato crop. It spread to England, where, in 1848, 786 cases were admitted into the London Fever Hospital alone. In that hospital as many as 14,589 cases were treated during the period 1862—70. In Glasgow, too, the death-rate per million for the five years 1855—59 was 1265, and for the five years 1860—64, 1576.

These figures show the extremely fatal character of this most formidable disease. Since 1869, this fatality has markedly and continuously decreased, until now it has almost reached the vanishing point.

In that year the deaths in England and Wales were 4281, in 1885 they were only 318, and the mean rate for the quinquennium 1891—95 had actually been reduced to four per million of persons living. In Glasgow, too, to quote from "The Evolution of the Functions of Public Health Administration," by Dr. Russell, "we begin with 3607 deaths from typhus in five years (1865—69), of which 50 per cent. took place in hospital; we end with 70 in five years (1890—94), of which 94 per cent. took place in hospital. In other words, whereas in 1865 610 beds were kept full of typhus, and yet more than one-half of the total cases were allowed to run their pernicious course at home, for many years now two wards of fifteen beds each, or thirty beds in all, have sufficed to receive all the cases known to exist in Glasgow.

In fact, they are often empty for weeks, and they are never full. This is an example of the attainment of theoretical perfection in isolation—the largest proportion isolated of the smallest quantity of disease existing. This result is not wholly due to the persistent enforcement of isolation. Typhus is peculiar in that its infectivity may by change of environment be weakened almost to extinction. Cleanliness and fresh air make it comparatively harmless. The deadliest blow struck at typhus in Glasgow was the suppression of overcrowding.

Surely if sanitarians could lay claim to no other achievement, they would be entitled by this to an honourable place in the history of the Victorian era, for no one can fully estimate the saving to the community alone by such a record. The causes of typhus were the evil conditions in which the great mass of the people lived and were housed in the earlier part of the century—conditions that are not yet fully remedied in many of our large towns and manufacturing districts—crowded areas, narrow courts, close, stuffy houses, where light and air, wholesome water, through ventilation, and proper drainage were impossible. In such places it took up its abode as a permanent resident. The history of London and other large towns furnishes ghastly illustrations relieved by efforts after amelioration, as, *e.g.*, the formation of great open roads, cut right through, so that at least a current of fresh air and a fair amount of light might follow. Sir R. Thorne Thorne says, "that between 1856 and 1887 a sum of over fourteen million sterling has been devoted by the Metropolitan Board of Works to measures tending almost exclusively to the destruction of unwholesome property, and to the opening up of wide thoroughfares and breathing spaces in the crowded parts of the metropolis; and this sum does not include over two millions spent on the Thames Embankments; neither does it take any account of outlay in the erection of wholesome dwellings to replace un-

[116] Horsfall's Patent Self-feeding Apparatus (patent No. 20,207, 1892).

* Presidential address to the members of the Midland Branch of the Incorporated Society of Medical Officers of Health, October 7th, 1897.

wholesome ones—this latter work having been almost altogether undertaken by bodies and individuals having no access to the public purse. Thus, the company of which Sir Sydney Waterlow is chairman has, during the past twenty-five years, provided model dwellings for 25,000 persons ; some £440,000 has been spent within the City precincts in artisans' and labourers' dwellings, and such bodies as the Artizans' and Labourers' and General Dwellings Company and the Peabody Trustees have laboured in the same direction. Indeed, an intimate relation must be admitted to exist between these efforts and the disappearance of London typhus." Similar results, following upon similar actions, have been obtained in other places, such as Liverpool and Glasgow, where the expenditure of large sums of money in the removal of crowded, unhealthy areas has caused the dlsappearance of typhus, with incalculable benefit to the community in the prevention of unnecessary suffering and the saving of valuable lives.

Back-to-back houses, it must be admitted with regret, still exist. It is interesting to note that so long ago as 1849 Sir John (then Mr.) Simon, in connection with the disease under consideration, strongly condemned them. It would seem desirable that the adoption of the Model Bye-laws of the Local Government Board, by which it is provided that dwellings shall have a minimum space both front and back, should be compulsory throughout the country.

The experiences I have related not only justify but imperatively demand that Local Authorities should make any outlay that may be necessary for the abolition of crowded areas, and of those "Blind Houses" which violate the first principles of hygiene. In prosecuting such work as well as in the provision of free baths and wash-houses, and in the inculcation of more decent views of personal and domestic cleanliness, Sanitary Authorities would find ample scope for their energies. They will have their reward not only in adding to the sum of human happiness, but in the improved health and higher moral tone of the people. The words of Dr. Russell are very encouraging. "The practice of free washing of clothes wherever dirt is found in presence of any infectious disease and the steady enforcement of household cleanliness at all times, as well as the facilities afforded by an ample water supply and baths and wash-houses have raised the standard of domestic cleanliness in the poorer parts of Glasgow to an extent which only those who remember their former state can appreciate."

TYPHOID FEVER.

This gratifying record of the gradual disappearance of typhus fever—due partly to its differentiation from typhoid—is almost paralleled in the history of the latter disease. When once the fact was recognised that typhoid or enteric fever was essentially "the fever of fæcal decomposition," the way was open for its prevention by rendering it impossible that the poison from the excreta of a victim should reach others through either the water supply or milk or other food, or air.

In 1869, the first year in which, as already stated, the returns of the two diseases were separately recorded, 13,967 deaths in England and Wales were registered from enteric and simple continued fever, while in the quinquennium, 1876—80, the average yearly number was 8657, and the years 1881—5 only 6671. Or to give the result in another form; in 1869 the death-rate from enteric fever was 0·39 per 1000; in the decade 1871—80 the annual mortality was 0·32 per 1000 living at all ages; in 1888 it was 0·17, and in 1896 it was the same.

In 1866 was issued the famous report by the late Dr. Buchanan on the improvement to the public health of certain communities, following on a purer water supply, and a better system of sewerage, and the consequent abolition of cesspools.

Dr. Buchanan in the Ninth Report of the Medical Officer to the Privy Council, examined the death-rates from all causes, and particularly from certain diseases, in twenty-five towns, before and after the introduction of these sanitary measures. The result was an average reduction of 10·5 per cent. in the general death-rate in nineteen towns, but the decrease was specially marked in the mortality from enteric fever. In twenty-one towns there was an average decrease of 45 per cent. in the deaths from this disease.

For instance, the annual mortality from enteric fever for every 10,000 persons living, at Merthyr Tydfil, fell from 21 to less than 9 ; at Croydon from 15 to 5·5 ; and at Penrith from 10 to 4·5. This experience has been confirmed in some continental towns. In Hamburg, out of every thousand deaths, the rate for enteric fever has fallen from 48·5 to 10·5 ; in Dantzic from 26·6 to 2·3, while in Frankfort, the deaths from the same cause have fallen from 9 to 2 per 10,000 of the population.

Pettenkofer propounded the view that there was a distinct, if not causal, relationship between enteric fever mortality and the changes in the moisture of the soil from the rise and fall of the ground water. Buchanan, however, while admitting the possibility of an indirect connection, believed the true cause of the increase to be impurity of the drinking water ; and there is no doubt, as Baldwin Lathom has shown, that it is not the ground water itself that is the cause of the disease, but the impurities in the soil set in action by its varying level. During the last forty years various reports, with which you are all familiar, by Inspectors of the Local Government Board and others, have proved conclusively that epidemics of this disease have been due to a contaminated milk or water supply. Cream too, has been known to convey it, and even freezing does not destroy the bacillus, for ice and ice creams have also served as the media for infection.

It is also stated that typhoid can be transmitted to man by the milk of cows suffering from a corresponding disease ; and there can be no reasonable doubt that the virus may occasionally be conveyed through the air. Recent inquiries, too, have shown that oysters and other shell-fish may be impregnated with the poison and so become dangerous to man. An extremely interesting example of this came under my own notice some months ago, of which I gave an account in my last annual report, and which is quoted in this month's *Public Health*.

It is probable that, as in cholera, the specific poison of enteric fever has not its maximum virulence when first passed from the body, and it is astonishing how small a quantity is sufficient to produce an epidemic. Sir R. Thorne Thorne and Dr. Buchanan have shown that in the Caterham Valley outbreak from polluted water (in 1879) "an amount of specifically polluting matter, so infinitesimal in quantity as to be altogether beyond detection by chemical analysis, was fully potent for

mischief." It is well, however, for us and the public to remember the words of Dr. Russell in discussing so ably this question in relation to Glasgow :—"While we ascribe so large a share in the reduced fatality of enteric fever to the prevention of milk epidemics, these are, after all, what may be designated acute events arising from passing causes. The chronic causes of enteric fever, those which sustain it as an endemic, are the daily crop of nuisances essentially related to excrement removal which spring up within and about the house, which it is a great part of the business of the Nuisance Inspector to abolish from day to day ; and defects in the cleansing and scavenging of ashpits, courts, and closets, for which the Cleansing Department is responsible. The plodding work of the Sanitary Department and the intelligently developed system of cleansing, which has already been commended, therefore deserve their share in the allocation of merit." The figures given in support of this statement are most instructive : The death-rate per million from enteric fever was—for the 10 years 1865—74, 481·3; for the 10 years 1875—84, 417·4 ; for the 10 years 1885—94, 193·4 ; and in Dr. Russell's tables the following are the brief but most significant notes added : 1865, first Municipal Fever Hospital ; 1868, Cleansing Department organised ; 1870, Sanitary Department organised ; 1885, systematic drain testing and special summer cleansing begun ; 1889, privy system condemned ; 1890, Notification Act adopted.

Of simple continued fever it is only necessary to state that as a cause of death it exhibits a corresponding decrease. While in 1869 the rate was 0·24 per 1000, in 1888 it was 0·015. This is, no doubt, due largely to improved diagnosis, and I confess that—as a disease distinct from typhus, typhoid, or relapsing fever, I do not know what constitutes continued fever. In the New Nomenclature of the Royal College of Physicians (1896 edition), it is given simply as "Febricula," which surely is only a symptom, and I agree with Dr. Berry, of Wigan, that the name should be removed from the schedule of fevers under the Infectious Diseases Notification Act (1888).

(*To be continued.*)

Complaints have been rife this winter, from various quarters, of the way in which the streets have been cleaned—or, to speak more correctly, been left uncleaned. The winter has been mild and open, and there have been no difficulties to contend with in the way of snow or slush, and yet the accumulations of mud that have been allowed by the Authorities to defile the streets in places that we could name, have been a disgrace to municipal administration. And in this matter the Vestries of prosperous West End districts are not least to blame. It has been said that the great objection to washing the slime from the pavements is that the mud that is washed into the gutters will choke the drains. And therefore it is allowed to remain *in situ*! The apology is but a cloak for inertia. Dirt is never defensible, and its removal depends simply on the exercise of a little enterprise and a little contrivance. Why is it that in some places we never hear complaints, while others are notorious for their slackness ?

THE DISPOSAL OF ANIMAL REFUSE.

SOME PARTICULARS OF A GERMAN SYSTEM WHICH IS ABOUT TO BE ADOPTED IN NOTTINGHAM.

By Dr. Philip Boobbyer, M.O.H., Nottingham.

The Health Committee of the Nottingham Corporation have long felt the necessity of providing some more cleanly, economical, and generally efficient means of dealing with the carcases of horses, with condemned (unwholesome) meat of various kinds, and other refuse animal matter, than has hitherto been afforded.

In the early part of 1897 I reported to the Committee that a patented German invention was on the market, though not yet sold in this country, for reducing horse and other refuse flesh and organic material, by the aid of superheated steam. I was thereupon instructed to obtain what particulars I could, respecting the cost and working of the apparatus, for the information of the Committee.

With the aid of the local agent of the German patentees, Mr. Richard Simon, of Zulla-road, Nottingham, I found that, although there was one installation of the apparatus about to be established at Bristol, there was none in actual work in the United Kingdom. There was, however, a considerable amount of reliable information to be obtained, both at home and abroad, from persons who had seen the apparatus at work, and, this having been laid before the Committee, they finally decided on October 29th, 1897, to send a deputation, from their own body, to Germany, to inspect the plant in operation.

The deputation consisted of the Chairman, Vice-Chairman, Mr. Alderman Jelley, Mr. Councillor Hunter, and the writer. It was decided that the deputation should proceed to the town of Essen, on the borders of Westphalia and the Rhine Province, where three of the apparatus were stated to be in full work, in the public abattoirs of that town. They accordingly started on Tuesday, November 9th, and travelling *viâ* Calais and Brussels, reached Essen on Thursday evening, November 11th.

The town of Essen contained, at the census of December, 1890, a population of 78,723, which is now estimated to have increased to close upon 100,000 persons. It is well known as the headquarters of the celebrated Alfred Krupp, in whose works nearly 50,000 of the inhabitants of the town are said to be employed.

Early on the morning after their arrival, accompanied by the Nottingham agent and two chief officials of the firm who make the apparatus, the deputation proceeded to the abattoirs on the outskirts of Essen, and found there, as stated, three of the apparatus in full work.

Each apparatus consists, essentially, of a jacketed cylinder 10ft. long by 4ft. 6in. diameter, known as the steriliser or disinfector, within which is a freely revolving perforated drum, furnished at its lower part with a heavy iron roller for grinding and expressing, and across its cavity with projections for stirring the contents. The cylinder is horizontally suspended on short steel shafts or trunnions, and is either oscillated or turned (as the nature of the work to be done may require) by means of reversing or continuous cogs and an archimedean worm.

Connected with this essential part of the

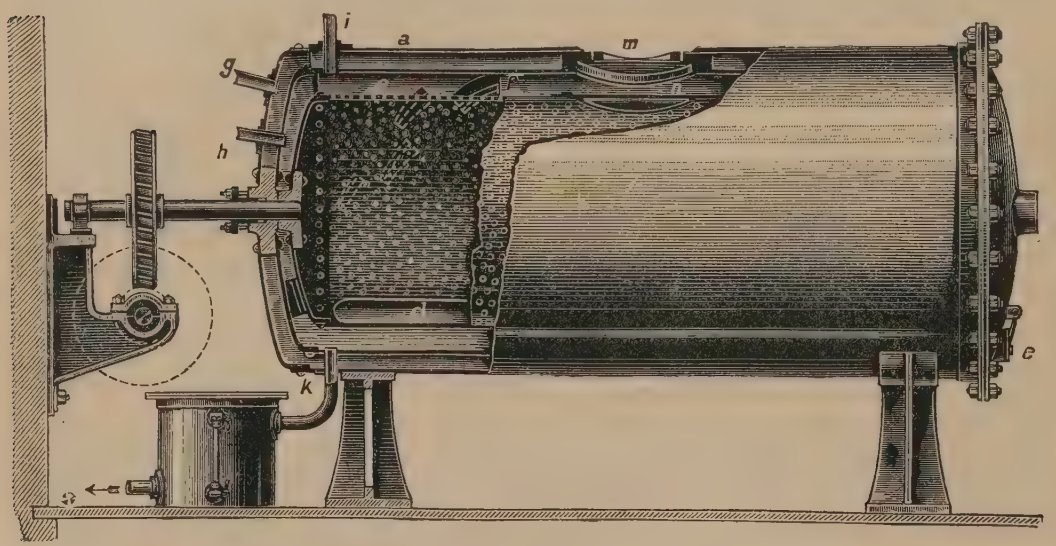
mechanism are closed iron vessels, known as "recipients," and "separators," for receiving and separating the fat and gelatin produced, which is forced into them by steam pressure, also a Lancashire boiler, and a small horizontal engine, with the necessary steam piping, shafting, ejectors or suction and pressure pumps (for fumes), condensers, &c. Each apparatus requires about a 2-horse power to actuate it.

The apparatus is now made only in two sizes (instead of three, as stated in the original prospectus). The price of each apparatus, less boiler, engine, and other accessories mentioned above, but, otherwise complete, fitted up in working order in this country, is :—No. 1 size, with capacity for two tons of raw material, £1084. No. 2 size, with capacity for one ton of raw material, £882. Two apparatus of No. 1 size, when sold together, are quoted at £1295 the pair.

The practical operation of the mechanism is conducted in the following manner :—

A load of flesh, fat, bones, &c., amounting to some 30 cwt. or 40 cwt., *i.e.*, a mass corresponding to the bulk of from three to four horses, or any lesser quantity that may have to be dealt with, is introduced, either through the manhole on the upper surface of the cylinder, or, when it is necessary to introduce an entire carcase, as in dealing with infected animals, by opening the whole end cover of the cylinder and allowing the carcase to slide down a shoot into its cavity. The inner space is now closed by a slide, and the whole cylinder by means of a clamped and steam-tight cover. Before describing the admission of steam to the jacket and drum, it may be as well to mention that from 45 lb. to 52 lb. steam (3 to 3½ atmospheres) is commonly used, but that 75 lb. steam (five atmospheres) is sometimes applied—the former when time is no object, the latter when it is. Steam, then, of from 45 lb. to 75 lb. is first admitted into the outer jacket, to warm the cylinder and its contents, the fume ejector (carrying offensive gases and vapour through a washer to the furnace) is opened, and the cylinder is caused to revolve or oscillate slowly

In the more recently constructed apparatus suction and pressure pumps are used for conveying the fumes to the boiler fire. After the temperature of the interior has been raised to about boiling point —212 deg.—the ejector is shut off, steam is introduced into the cavity of the cylinder, and the process of steam digestion commenced. After the latter has been continued for some three or four hours the fat and gelatin, which are now completely separated, are forced out into their above-mentioned receptacles (recipient and separator) by steam pressure. The steam is then shut off from the interior and supplied only to the jacket in order to dry the residual "manure" remaining in the interior, and the fume ejector is opened. After the lapse of from two to five further hours—the length of this period varying with the temperature of the steam, and the mass of material to be dried —the whole of the residuum will have been completely desiccated, and forced by the roller through the perforations in the drum. This stage of the process being satisfactorily completed, the door at the end of the cylinder is opened, and the contents automatically discharged or removed by manual labour.



Apparatus for Disposal of Animal Refuse

The fat extracted from the carcases of the horses, and other animals commonly available, is of excellent quality, and fetches from 12s. to 14s. per cwt. The gelatin, chondrin, &c., cannot be used for glue-making, on account of the high temperature to which they have been exposed. They can be used only for the making of size. The dry residuum has been spoken of above as manure, but it is stated also to be an excellent, though somewhat rich food for pigs, fowls, and other creatures. It is sold at from 3s. to 4s. per cwt. (sacks included), in sacks measuring, when full, 2ft. 6in. by 1ft. The material scales almost uniformly 110 lb. to the bushel measure.

In addition to the process here described there is one by which the offals, abattoir manure and sweepings, blood and other organic detritus of the shambles, are reduced to odourless manure in similar cylinders and by similar methods to those

already detailed, except that no "recipients" or "separators" are called into use, there being no fat or gelatin worth mentioning to be obtained from the raw material to be dealt with. The product of this last process is said to be saleable at from 1s. to 2s. per cwt.

The fat produced by the first process is said to contain only about 1½ per cent. of water. The residual manure from the first process is reputed to contain: water, 6·2 per cent.; nitrogen, 6·47 per cent.; phosphoric acid, 13 per cent.

The manure from the second process seldom contains, it is said, more than 2 per cent. of nitrogen, and cannot therefore be of any great value, except perhaps for lightening heavy soils.

To give some idea of the business value of the first process, the following analysis of its actual test operation in a single apparatus of No. 1 size, and the result thereof, during a period of ten days (comprising 95½ working hours), has been worked out by Dr. Pöbel, of Cassel:—

Weight of flesh, &c., digested.	Description of animal yielding material.
23,430 lb.	Horses.
4,510 lb.	Horned cattle.
2,145 lb.	Swine.
165 lb.	Deer.
30,250 lb. (= 13 tons 10 cwt.)	

The digestion of this total yielded—

3,739 lb. fat = 33·4 cwt. (= 1 ton 13 cwt.)
5,896 lb. guano = 52·6 cwt. (= 2 ton 12 cwt)
? size.

33 cwt. fat at 12s. =	£19	16	0
52 cwt. guano at 3s. 6d. =	9	2	0
	28	18	0
58½ cwt. coal used at 6d. =	1	9	3
Gross	£27	8	9

Disinfection is so completely effected by the process of steam digestion, that, in Germany, the carcases of animals that have suffered from any of the infectious diseases, including glanders, are allowed to be disposed of in this manner.

To show, however, that the practice does not arise from a careless disregard of the dangers of infection, it may be mentioned that it is customary in many parts of Germany to raze to the ground all buildings in which glandered animals have been housed.

The Otte plants at Essen are attached to the public abattoirs of that town, and, with the latter, are owned by the municipality.

Although a large quantity of flesh and other material was in process of digestion in all the apparatus at the time of the deputation's visit, no offensive smell was perceptible at any part of the premises.

DIARRHŒA.*

By Alfred Hill, M.D., F.R.S.E., F.I.C., M.O.H., Birmingham.

I have frequently shown, in previous reports, that outbreaks of Summer Diarrhœa do not occur until the temperature of the ground has reached a certain point, and that they are closely associated with the careless feeding of infants. But the fact has been established that these two influences will not operate in a marked degree, unless insanitary conditions are also present. The most probable theory regarding the disease is that it is dependent on some micro-organism which resides in or near the surface of the earth, and which can only become active where there is dead organic matter present and after the temperature has become sufficiently high. Given these two conditions, it appears that the organism can become air-borne, and may be taken into the body with the food and drink, with the result that diarrhœa is set up. If, therefore, diarrhœal outbreaks are due to an organism that depends for its existence on dead organic matter, or in other words, on animal and vegetable refuse, it is obvious that to prevent visitations of diarrhœa, we must remove all those conditions which promote the retention of such refuse instead of its speedy removal. The most important of these conditions, as found in towns, are (1) unpaved and filth-sodden ground in proximity to houses; (2) accumulations of excreta in unsuitable positions; (3) stagnation of air both inside and around dwellings, by which organic impurities are able to accumulate in the air instead of becoming diffused.

On many previous occasions I have called attention to the occurrence of summer diarrhœa, especially in relation to the above points. Immediately after the recent outbreak of diarrhœa, I tabulated the results of 500 inspections of houses in which deaths from diarrhœa occurred during August. I found that in 158 instances there was a part of the yard or court which was neither paved nor cultivated. In most cases such ground is uneven, and allows rain water to lodge on it. Moreover, as a rule, it is not kept clean, house refuse, such as bedroom slops, bread, fish heads, tea leaves, and other vegetable refuse, and even excreta, being noticeable in some instances. The evil is also aggravated in a great many cases by the keeping of fowls, ducks, or pigeons close to the houses, and in confined situations. Now it appears to me that such unpaved and filth-sodden yards must be most suitable places for the development of an organism that requires organic refuse for its subsistence, and must therefore be an important factor in the production of diarrhœa. I therefore recommend, as I have done on previous occasions, that all yard surfaces be paved with some impervious material, such as blue bricks in cement, and that the keeping of fowls, ducks, or pigeons, near to houses, be not allowed.

I further found that out of the 500 houses examined 300 had pan privies, and 38 had ashpit privies. Now, in a pan or ashpit privy, even if it is well placed and well looked after, there must naturally be retention of fæcal matter for a considerable time, instead of immediate removal as in the case of a water-closet. Unfortunately, in most instances, these pan and ashpit privies are in very bad situations, being close to houses, and in confined, ill-ventilated positions. Moreover, they are often only imperfectly scavenged, refuse being noticeable around the pan in the space under the privy seat, as well as in the ash place, even after the excreta and house refuse have been collected. In many cases urine escapes on to the floor around the pan. Here, again, we have some of the most essential conditions for favouring diarrhœal mortality. The only satisfactory method of dealing with both pan and ashpit privies is

*Abstracted from the Report of the Health of the City of Birmingham for the third quarter of the year 1897.

to abolish them entirely, and to substitute some form of water-closet, and I recommend that such steps be taken as will cause this improvement to be rapidly carried out. But in the meantime I consider it imperative that the privies should be kept in better order, and for this purpose I recommend that the ashes from houses having pan privies be fetched away in the day time, and that the men who fetch them be made responsible for sweeping and swilling the privy, both in front of and under the seat, as well as for properly cleansing the ash-place, and for removing all refuse except such as is produced in the course of some trade process.

My inquiry showed that out of the 500 houses examined 301 consisted of three rooms or less, while only 23 had more than six rooms. Moreover, 290 out of the 500 had no through ventilation, and 281 opened into courts or terraces, and not into the street. Most of the houses in which diarrhœa occurred were, therfore, very small houses, with imperfect ventilation both within and around them. In and near such houses organic impurities from many sources are certain to accumulate, instead of being dispersed, as they would be in better houses where there is more air space and freer ventilation; and as diarrhœa is so closely associated with organic impurities it is but natural that such houses should suffer heavily from the disease. In seeking to improve the condition of things in these small houses two main points have to be borne in mind. Firstly, there must be sufficient air around the outside of the house, and facility must be given to this air to move freely, so that there may be no stagnation. Secondly, adequate provision must be made for the passage of a current of air through the various rooms of the house. In many of the older courts in the city the amount of space in front of the houses is miserably inadequate, in some cases less than 10ft. across measuring from the front of the house, while the means of ventilating the rooms are not effective, inasmuch as there are no back doors or windows. The only satisfactory plan of dealing with these houses is by demolishing a certain number in every overcrowded court, so as to increase the amount of open space and afford facilities for better ventilation by means of additional windows in the houses that remain. I therefore recommend that wherever houses in crowded courts are closed as unfit for habitation, efforts should be made to get them demolished rather than repaired; and that where the houses in a court are closely crowded together, but not in themselves unhealthy, they should be removed in accordance with the powers given with regard to obstructive buildings by the Housing of the Working Classes Act.

I am convinced that it is only by such means as I have just suggested that the diarrhœal mortality, and with it the general mortality, can be substantially lessened. I most earnestly hope and trust that the measures I have suggested will be carried out, and they will produce as I have no doubt they will, a real improvement in the health of all who live in the less favoured parts of our city.

Meteorology and Mortality.

The chief interest in the meteorology of the quarter lies in the intimate connection which is known to exist between climatic conditions and diarrhœal mortality. I have already alluded to the theory that the essential cause of diarrhœa is a micro-organism which has its home in the earth's superficial layer, but which remains inactive until the temperature of the ground, not of the air, has become high enough to favour its development. This view is certainly confirmed by the figures for the past quarter, which are as follows :—

Weeks ending.	Highest temperature of the air.	Highest temperature 4ft. below the surface of the ground.	Deaths from diarrhœa and enteritis.
June 5	70·0	48·5	14
,, 12	79·1	49·3	14
,, 19	81·0	50·2	4
,, 26	80·2	50·7	8
July 3	73·7	51·9	8
,, 10	68·0	52·2	6
,, 17	78·3	52·8	16
,, 24	76·6	53·2	42
,, 31	75·2	53·6	81
Aug. 7	84·4	54·5	160
,, 14	72·1	55·0	228
,, 21	68·8	54·9	224
,, 28	66·0	54·6	157
Sept. 4	65·2	54·4	89
,, 11	62·5	54·0	44
,, 18	63·8	53·3	44
,, 25	61·7	53·1	33
Oct. 2	65·8	52·9	26

A study of these figures will show that the relation between the air temperature and the mortality from diarrhœa is by no means constant, that is to say, that the deaths from diarrhœa do not rise and fall with the fluctuations in the temperature of the air. For instance, the air temperature in June was much higher than in July, yet the diarrhœal mortality was much lower. Even in August, also, the air temperature was but little higher at any one period than in June, while on the whole it was lower; yet in August the deaths from diarrhœa were something like twenty times as numerous as in June. On the other hand, it will be noticed that the ground temperature was rising steadily during June and July, that it reached its maximum in the week of greatest diarrhœal mortality, and that as soon as the ground temperature began to fall the diarrhœal mortality began to decrease also. The experience of the past quarter entirely strengthens the view that it is the temperature of the earth, not of the air, that determines the prevalence of diarrhœa, and, therefore, that the germ of the disease must reside in the earth's crust.

The mean temperature and the rainfall for each of the past three months are shown below :—

Temperature.

1897. Month.	Mean temperature for month.	Average for ten years, 1887-1896, inclusive.	Above or below the average.
	deg.	deg.	deg.
July	61·0	59·2	+ 1·8
August ...	60·1	58·5	+ 1·6
September ...	52·9	55·2	− 2·3

Rainfall.

1887. Month.	Rainfall for month.	Average for ten years, 1887-1896, inclusive.	Above or below the average.
	in.	in.	in.
July	0·95	2·51	− 1·56
August ...	3·81	2·85	+ 0·96
September	2.48	1·98	+ 0·50

A NEW DIETETIC.

In a recent issue of the *Deutsch Med. Wochenschrift*, Drs. Schrieber and Waldvogel dilate upon a new albumen preparation called "Sanose," the most recent addition to the many valuable therapeutic agents for which the eminent German *savant*, Schering, is responsible, and which Messrs. A. and M. Zimmerman, of 9-10, St. Mary-at-Hill, London, E.C., are with characteristic enterprise introducing to the medical profession of this country.

Sanose, it appears, is a combination of 80 per cent. casein with 20 per cent. albumose, and a combination of these two classes of substances—digested albumen (albumose) and casein—appears especially advantageous, because pure albumose, as well as Liebig's meat peptone, forms a peculiar combination with casein. Whilst pure casein on boiling with water gives a sticky caoutchouc-like mass, if well triturated with a fifth of its weight of albumose it loses this characteristic, and a completely suspended milk emulsion is obtained.

The peculiar behaviour of milk may possibly be thus explained. If milk is repeatedly shaken with ether, the fat may be gradually extracted without the milk losing its milky appearance. Consequently the milky appearance is not solely due to the suspended globules of fat. Moreover, the casein of milk is not separated by boiling the latter, which has been attributed to the combination of casein with calcium or phosphate of sodium. For some time, however, it has been known that milk exhibits exactly the same behaviour when completely freed from salts by dialysis. In milk, there is, however, besides casein, a comparatively small quantity of an albumen, which differs from white of egg, inasmuch as it does not coagulate on boiling, thus possessing a nature more like albumose. The presence of this albumose-like material is very likely the true explanation of the casein in milk not being precipitated by boiling, just as in Sanose it is the albumose which prevents this.

To this explanation we may add that Kirchner attributed to the small quantity of peptone in milk the easy digestibility of that fluid. The greater digestibility of some milks is also known to be due to the finer aggregation of the casein flocks, as shown by comparison of human milk and cow's milk.

This similarity of Sanose to milk, and especially to human milk, gives it a peculiar value, for, as a matter of fact, when Sanose is mixed with water a milk-like liquid is formed.

Sanose is a white powder, odourless and tasteless, forming an emulsion when stirred with water. It has been administered in the following forms:—In milk and cocoa (about one to two ounces in a pint of milk) in pea soup (about one-sixth of an ounce to a plateful), and with soup powder. In none of these forms is Sanose observable to the palate, and it may, therefore, be taken by patients for a prolonged period without objection. Influenced by the opinion that a pure albuminoid diet does not satisfy all the requirements of a sick organism, the writers say they have sought to combine Sanose with other foods of easily-digested character. Thus to one patient they gave Sanose mixed with lævulose, but this mixture proved rather too sweet. A mixture of Sanose with maltose, isomaltose, and dextrine, proved very appetising, and it is thought possible that by combining these easily-digested carbohydrates with Sanose and an easily digested fat in a gelatine capsule, all the necessary food-stuff may be supplied. Experiments are being made in this direction.

For ordinary household purposes Sanose is suitable as an albumen preparation for addition to all foods prepared with flour or meal. Further, it may be added to bread to increase the albuminoid contents. A very tasty bread was obtained with 10 per cent. Sanose, and having a total albuminoid contents of 20 to 30 per cent. For patients who object to meat, or to whom its enjoyment is more or less forbidden—as in nephritis, uric acid diathesis, or diabetes—Sanose bread will, it is surmised, prove an agreeable substitute for aleuronate bread.

Being a palatable, easily-absorbed albumen preparation, and possessing the advantage that no flavouring chemicals are added, Sanose would appear to deserve the serious consideration of all medical men.

Its development will doubtless be watched by them with much interest, and we hope to be able to report progress from time to time concerning it. We understand, *en passant*, that *The Therapist* for the current month contains a valuable contribution to the literature accessible upon the subject, and to its pages we would refer all who are anxious for further enlightenment upon the result of Schering's ingenuity and research.

THE PURIFICATION OF FEED-WATER.

Among the papers presented at the convention of the American Society of Mechanical Engineers at New York, and forming a portion of the "Transactions" (December, 1897), one by Howard Stillman, upon a water-purifying plant, elicited much discussion, and demonstrated that the evils of boiler scale are appreciated by many steam users and engineers.

The plant described by Mr. Stillman is one installed by the Southern Pacific Railway Company at Port Los Angeles, California, for the purification of feed-water to be used by the locomotives on that division. The plant is of interest because of the bad quality of the water treated, there being a large proportion both of carbonate and sulphate of lime and magnesia present, and also because it is a practical working installation in constant and continuous service, about which definite and trustworthy data are available.

The method employed consists of a double treatment of the water, with cream of lime and with carbonate of soda, the reagents being added successively in order to obviate the direct formation of carbonate of lime, which would otherwise occur by the combination of the two reagents with each other. The exact treatment of the water is determined by chemical analysis, after which the necessary amounts can be weighted out and used for each tank full of water. Two purifying tanks are used, the lime being added first, and the precipitated carbonates permitted to settle out, after which the liquid is passed to the second tank and the soda added.

The result is the removal of most of the carbonates and the conversion of the sulphate of lime and magnesia into sulphate of soda, the incrustating matter being reduced from nearly 40 grains per gallon to about 10 grains, and in practice the scaling in the boilers being practically stopped.

The question of the real advantage of purifying the water before feeding it into the boiler is one which elicited some discussion in connection with this paper, and, notwithstanding the objections made to "turning the boiler into a chemical laboratory," several engineers asserted that practical experience showed no harm from the addition of the soda directly to the feed-water in the boiler.

The real criticism of the method lies in the fact that it only partially accomplishes the desired result, leaving fully one-fourth of the scale-forming constituents still present, and reducing the quantity of solid matter in solution by only about 20 per cent. While this may be the best that can be done in purifying water in stock for locomotive water stations, as good if not better results can be accomplished by the use of high-temperature heaters and purifiers, precipitating the sulphates by the use of high-pressure steam in a closed heater.

BEDROOM SANITATION.

THE *Ohio Sanitary Bulletin* says: No room in the dwelling exercises a more potent influence for or against health than the bedroom, excepting possibly the kitchen. The bedroom is occupied for eight or nine hours of each twenty four, and during the time when vitality is at the lowest ebb, and injurious influences therefore most potent.

It is customary with some to have a light burning all night in the bedroom. This is usually a lamp or gas light turned low. This adds greatly to the impurities of the atmosphere and necessitates the bringing in of much larger volumes of fresh air, if we are to keep near the standard of purity. The light is also objectionable on account of the eyes, as previously stated, and most persons have a sounder and more refreshing sleep in darkness than in light.

We may say, then, that our bedrooms should be moderately heated, and that opportunity for fresh air should be given, and by open windows, if necessary. It is usually better to do this by lowering the upper sash. In planning the room the position of the windows and bed should be so arranged that window ventilation can be accomplished without exposing the sleeper to direct draughts. We need have no fear of that bugaboo, night air. Night air is just as wholesome as day air, and in cities is apt to be more so, as being not so much exposed to pollution by reason of travel on the streets.

The location of the bedroom should be such as to admit direct sunshine at least a part of each day. There is no more powerful microbe slayer than sunshine, and the more of it and fresh air we can have in our dwelling-houses the less need will there be for the doctor.

The careful housewife will see that her beds and bed clothing are aired each day and frequently hung on lines out of doors to be exposed to the sun. The furniture of a bedroom should be as simple as possible. Rugs, which may be large enough to cover most of the floor, should be used instead of carpets, as being much easier kept clean and free from dust. Heavy curtains, upholstered chairs, and other dust-catching and retaining contrivances, should have no place in a sleeping-room.

All that has been said may be summed up in fresh air, sunlight, and perfect cleanliness.

Institute of Sanitary Engineers

THE first meeting of the year was held on Thursday, January 13th, in the Arbitration Room, 64, Chancery-lane. Mr. George Macadam, of Berwick-on-Tweed, read a paper on "The Sanitary Laws of the Hebrews, viewed in the Present Light of the Nineteenth Century." He said:—

Mr. Chairman and Gentlemen—When asked by your secretary to prepare a paper to be read before the Institute of Sanitary Engineers, I experienced some difficulties: First, in choosing a subject to write about, and, secondly, in writing about the subject chosen. Before despising, however, what may appear feeble and impotent, we should remember that men of science such as Professor Bailey and others tell us of a minute marine insect with microscopic shells, diatomaccæ and others, which, when alive, glow and sparkle on the surface of the sea, and there build their habitation. When they die they sink in vast multitudes and settle in the bottom of the ocean; these are really the atoms of which mountains are formed and vast plains spread out. If, therefore, my humble paper is but one atom towards building up the sanitary world I shall feel content.

I also hope that to-night we will recognise in history that something of a similar process goes on all the world over; that the influences which appear merely transient have not been so, but have reappeared in other forms and places; that the little things which were forgotten have not been obliterated, but instead have only been accumulating and gathering power. So with the sanitary laws of the people we mention to-night, they may have been lying dormant for thousands of years, only to come to light and power with tenfold usefulness.

Before beginning I wish you to understand that I am not of that favoured people—the Jews. I am afraid a Mac would scarcely pass muster in the Hebrew genealogy; nor yet am I advocating any Jewish or other doctrine, but simply endeavouring to draw a comparison with a few of the sanitary laws which existed long before the British Isles were civilised, but now a nation which I think may justly claim to be the missionaries of all sanitary reform. Upwards of three thousand years ago there existed sanitary laws which are well worthy of our attention, and which might be viewed in the present light of all our modern scientific sanitary research.

During the theocracy on the democratic government of the Jewish people as a nation, these laws were imperative, although there is no evidence existing to lead us to suppose that these people knew anything about bacteria or microbes, &c. In this important matter the people could scarcely be expected to be schooled, having just been brought out of Egypt, where they had been in abject slavery for about 400 years, with little facility for research as regards microbes. Rather they were occupied now in search of something more substantial. Yes, they lived on in blissful ignorance as to the sport and havoc this tribe of microbes played with the sons of men, just the same as we have been living in ignorance, until Mark Twain, by the way, in his wonderful book, "More Tramps Abroad," pictures

us but as microbes of a Great Creator ourselves. Yet these people, the Hebrews, had an Infectious Disease Act, coupled with a Notification Act, upon which, I think, we have improved very little.

Their most terrible scourge was leprosy. The laws and regulations relative to this and similar diseases were most stringent, and perhaps more carefully adhered to than our laws for typhus, small-pox, or diphtheria. On the slightest appearance of anything like the above-named disorders, the infected person was to notify the priest, who, by the way, acted as Medical Officer of Health. The regulations for him were most explicit; if the slightest doubt remained as to his diagnosis of the disease, the sufferer was kept for seven days, after which he was again examined. If then the priest considered him according to law not in a contagious condition, he was kept yet another seven days, then pronounced clean, after which both his body and clothing were washed before exposing himself in the camp. One kind of leprosy—Lepro-Mosaica, covering the body with white spots appeared, after it had spread itself all over the infected one—seems to have died and gone back, much like our small-pox, which after the patient had thoroughly recovered was again perfectly healthy. The Egyptian bondage with its studied degradation and privations, and especially the work of the kiln under the Egyptian sun, must have had a frightful tendency to generate this class of disease. Hence one historian, Manetho, asserts that the Egyptians drove out the Israelites as thoroughly infected with leprosy.

It is remarkable that a nation of slaves newly emancipated should have framed a code of laws so entire, laws which if England as a nation had embraced one hundred years, might have prevented many a serious epidemic. Instead of looking upon infectious disease as a scourge sent us from above, we would have found the cause emanating from our filthy houses and surroundings and general uncleanliness.

Let me refer one moment to the state of matters existing prior to the Royal Commission's report in 1838—9, and which was published in 1842. There existed, mark you, certain sanitary laws prior to this time, but the many difficulties in administering the same made them unworkable, but more like what we would call in Scotland, like a when Tata bogles, more like to frighten folks than be of any material use.

I could tell you about houses, from London to Glasgow, the conditions of which were hotbeds for all infectiousd iseases. Cottages below the street level with mud floors. Open ditches running by, and every now and again flooded with filth. Dung heaps and filth accumulation stored for twelve months against the walls of the houses. Fever patients lying dying amongst the living was the general thing at certain seasons of the year. I shall give you two examples (one in Glasgow first): We entered a dirty low passage, like a house door, which led from the street through the first house to a square court immediately behind, which court, with the exception of a narrow path around it, leading to another long passage, through a second house which was occupied entirely as a dung receptacle of the most disgusting kind. Beyond this court the second passage led to a second square court occupied in the same way by its dung-hill, and from this court was a third passage leading to a third court and a third dung heap. There were no privies or drains there, and these dung heaps received all the filth from the swarm of wretched inhabitants, and we learn that a considerable part of the rent of these houses was paid by the produce of the dunghills. Thus, worse off than wild beasts, many of which withdraw to a distance and conceal their ordure. The dwellers of these courts converted their shame into money to pay their lodgings. The state of the open drains was something horrible.

Take Windsor, where rank and wealth resided. From the back of the gas works (in 1842) to the end of George-street a double line of open, deep, black and stagnant ditches extended to Clewer-lane. From these ditches an intolerable stench was perpetually rising and producing fever of a severe character. There were other drains equally bad running from the barracks into the Thames. The contents of these ditches were only carted away when sold as manure. It may seem strange that an existing law, which was read almost daily in our churches, should not have been made applicable to our own country before the latter part of the present century. Yet you will admit that legislative power can only be passed when a country is in some measure prepared for it. One of the most difficult things to attain to is thorough co-operation with the masses of the people to assist the Sanitary Authorities in carrying out these Acts, their officers looked upon as a limb of the law to be dreaded, instead of considering that they are assisting to pay the man whose duty it is to protect their health; and this in the enlightened nineteenth century.

(To be continued.)

General News.

SALTCOATS.—The Commissioners of Saltcoats and Ardrossan have decided to erect a new joint hospital. The site has not yet been fixed.

WORTHING.—The Town Council has resolved to apply to the Local Government Board for sanction to borrow the sum of £2750, the estimated cost of covering in the new reservoir at the waterworks.

KNARESBOROUGH.—The Rural District Council has appointed a deputation to meet a similar one from the Urban District Council with the object of discussing the advisability of providing a joint infectious diseases hospital for the district.

AYR.—A committee of the Public Health Committee has been appointed to take all necessary steps towards the stamping out of the present epidemic of scarlet fever in the town. The authorities are convinced that the fever was caused by contaminated milk. It is of a mild type.

TRURO.—The City Council recently considered a report by Professor Kanthack, which stated that oysters sent to him showed strong evidences of sewage contamination. It was explained that the worst report was on oysters taken from Malpas, whilst those further down the river were given an almost clean bill, and it was resolved to forbid the laying down of oysters at Malpas in future.

MARKET BOSWORTH.—The Council has decided to erect an isolation hospital at Ibstock.

WORCESTER.—A loan for £400 for the purchase of twelve Deacon's waste-water meters has been applied for.

RUGBY.—A report to provide a better water supply, at a cost of £20,000 to £25,000, is under the consideration of the Council.

HEANOR.—The Urban District Council is considering the purchase at a cost of about £600 of a plant in connection with the well-boring.

TUNBRIDGE WELLS.—The Town Council has decided to appoint a temporary Assistant Sanitary Inspector, at a salary of £100 per annum.

HARTLEPOOL.—An outbreak of typhoid fever has broken out at the workhouse, and last week the number of cases had reached seventeen. The entire investigation of the cause is in progress.

HETTON.—The Urban District Council of Hetton-le-Hole has decided to write the Houghton-le-Spring Rural Council drawing attention to the fact that the Council was allowing the water to be polluted at the Dene House Farm.

GLOSSOP.—Owing to the prevalence of scarlet fever in the borough, the Corporation has decided to enlarge its fever hospital by the addition of a new wing, 40ft. by 20ft., at an estimated cost of £200. The new portion will provide for eight more beds, and will be used at first for convalescent patients.

HOLLAND (LINCS.).—The Board of Agriculture has notified the Committee of the Council having the administration of the Contagious Diseases (Animals) Acts that it is not in a position for the present to remove the restrictions. The committee has decided to license the markets at Spalding and Holbeach for the sale of fat swine for slaughter.

BARRY.—The Hospital Committee of the Barry District Council has resolved that a site of not less than five acres shall be obtained for the purposes of a general hospital for Barry, and that an accident ward, with accommodation for twenty-four beds, shall be provided forthwith, this building to be in accordance with a block plan capable of enlargement at any time.

LONDON.—The want has been felt for many years at the Zoological Gardens of an independent water supply, and recently it was decided to put down an artesian bored tube well, the results of which have been, as was anticipated, the tapping of powerful springs of pure water in the chalk at the depth of 450ft., yielding 240,000 gallons per day. The engineers are Messrs. C. Isler and Co., of Southwark.

LEITH.—The deaths registered within the burgh during the year 1897 numbered 1526, giving a death rate of 20·2 per 1000. The deaths in 1896 numbered 1183, and the death-rate was 16 per 1000. Of the total deaths, 183 were due to infectious disease, viz.: Measles, 93; whooping-cough, 68; scarlet fever, 11; typhoid, 4; diphtheria, 4; membranous croup, 1; small-pox, 1; puerperal fever, 1. Of the total deaths, 743 were of children under five years old, and 437 of these were under one year. Under the Notification Act, 644 cases of infectious disease were notified. The births registered numbered 2518, giving a birth-rate of 33·4 per 1000.

SUNDERLAND.—The Council has decided to advertise for an inspector of sewers at a salary of £140, to rise by £10 per annum to a maximum of £180.

EAST MOLESEY.—It appears that the Southwark and Vauxhall Water Company propose to construct two large storage reservoirs, practically covering about 146 acres.

LAMBETH.—A Doulton Institute for the use of the workmen of the firm of Messrs. Doulton and Co., Lambeth, as a memorial to the late Sir Henry Doulton, is to be erected in High-street.

NORTHWOOD.—The Newport Waterworks Committee has decided to acquaint the Rural District Council that the Corporation is prepared to purchase the mains, &c., by agreement or valuation.

WINSFORD.—The Urban District Council at a recent meeting discussed the scheme of the Cheshire County Council for providing a joint infectious hospital for Mid-Cheshire. Most of the members opposed the scheme of the County Authority, and a resolution was passed to the effect that the Council could not see its way to take any immediate steps in the matter, being already possessed of a temporary hospital, which was adequate for present needs.

EDINBURGH.—The Social and Sanitary Society of Edinburgh was to present on the 11th inst. a petition to the Corporation of Edinburgh, the principal clauses of which urge the registration of a separate lodging-house for women only, and the appointment of one or more women as Sanitary Inspectors. At present, although there are forty registered lodging-houses, there is not a single one reserved exclusively for women, and there is no woman Sanitary Inspector.

WHITBY.—The Rural District Council instructed Messrs. D. Balfour and Son, civil engineers, Newcastle, to report on a scheme of water supply for the township of Tylingdales in its district, including Robin Hood's Bay, Thorpe, and Thorpe-lane. The engineers' recommendations, which have been adopted by the Council, are the acquisition of the numerous springs at Spring-hill, and conveying to a collecting chamber, thence the water to be taken in a 5in. main to Park-gate, where it is proposed to construct a service reservoir, with a capacity of 200,000 gallons. The water will then be distributed over the township in cast iron mains, with the necessary valves and other appurtenances.

CAMBORNE.—From Wadebridge the scene of a scourge of typhoid has been shifted to Camborne. Apart from, or rather in addition to, any neglect of sanitary precautions, there has probably been something peculiarly favourable to the germination of typhoid in recent atmospheric conditions. Where there has been anything like pollution of water supply, no doubt the mild season has favoured the outbreak of a typhoid epidemic. It seems to be conceded that one source of the water supply of Camborne and Illogan has become polluted, and that the present very serious epidemic has been the result. The Truro Sanitary Committee has already been led to thoroughly inspect the water supply of the city.

Personal.

MR. A. FRIGELLE has been appointed Vaccination Officer for Dudley.

MR. J. CLOUGH has been appointed Medical Officer for the First District of Hunslet.

MR. WILSON, Chief Constable, has resigned his appointment as Sanitary Inspector for Montrose.

J. R. M. RICHMOND, L.S.A., has been appointed Medical Officer of Health for the rural district of Overton.

W. E. HACKER, M.D., B.S., has been reappointed Medical Officer for the River Tyne Port Sanitary Authority.

T. G. DICKSON, L.R.C.P., L.R.C.S., Edin., has been appointed Medical Officer of Health for the urban district of Hay.

DR. BERNARD DYER has been reappointed Analyst for Cornwall, under the Fertilisers and Feeding Stuffs Act, 1893.

HUGH T. JONES, L.R.C.P., M.R.C.S., has been reappointed Medical Officer of Health for the urban district of Hucknall Torkard.

THE Skipton Urban District Council has increased the salary of its Surveyor, Mr. T. Mallison, by £30 per annum.

DR. HARPER has been appointed by the Joint Hospital Committee, Medical Officer for Clenoch Hospital, during the current year.

MR. ROBERT SQUIRE has been appointed Inspector of Nuisances for the urban district of Ottery, at a salary of £30 per annum.

DR. WALKER has been reappointed Medical Officer of Health for the Rural District of Stoke-on-Trent, at a salary of £55 per annum.

MR. H. BOTTOMLEY has been reappointed Surveyor, and Dr. Macgregor Medical Officer, for the outer district of Bingley, for the ensuing twelve months.

MISS ALICE BILLINGS, of Forest Gate, has been appointed Lady Sanitary Inspector under the West Ham Town Council, at a commencing salary of £80 per annum.

MR. DAVID BALFOUR, M. Inst. C.E., F.G.S., 3, St. Nicholas'-buildings, Newcastle-on-Tyne, has taken into partnership his son, Mr. David Balfour, jun., Assoc. M. Inst. C.E., and the business in future will be carried on under the name of D. Balfour and Son.

MR. THOMAS M. DRAPER has been appointed Inspector of Drainage Works for new buildings under the Withington Urban District Council. On leaving the Manchester Sanitary Department his late colleagues presented him with a valuable collection of scientific books. Chief Inspector Stansfield, who made the presentation, observed that Mr. Draper had held the position he was leaving for upwards of ten years. The books he had the pleasure of presenting would be of essential service to him in his new duties, but it was not merely their intrinsic value that he would esteem, but more especially the good-will of his fellow inspectors, of which the gift would be an abiding memento. They all agreed in wishing him success in his new appointment.

DR. FRASER has been reappointed Medica. Officer for Colwyn Bay.

MR. C. R. H. CRAWFORD has been appointed Medical Officer for the Fifth District of Tonbridge.

R. LLEWELYN JONES., M.B., L.R.C.P., has been appointed Medical Officer to the Durham County Asylum.

THE Town Council of Nelson has increased the salary of Mr. C. T. Copley, its Assistant Surveyor, by £25 per annum.

MR. J. M. S. PRESTON has been appointed Assistant Medical Officer of the New Bridge-street Workhouse, Manchester.

THE Local Government Board has sanctioned the appointment of Dr. Knapp, as Medical Officer for the Rural District of Ross, at a salary of £60 per annum.

Sewerage Schemes.

[To MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

A LOCAL Government Board inquiry has been held at Ffynnongroew into a complaint of the default of the Holywell Rural Council in not providing sewers adequate for the locality.

A LOCAL Government Board inquiry was held at Marlborough on Friday, the 14th inst., into an application of the Town Council for sanction to borrow £6800 for the purpose of sewerage and sewage disposal.

A LOCAL Government Board inquiry has been held at Ramsbottom into the Council's application for sanction to borrow £15,000 for sewerage works, and £5,000 for street improvements. The Inspector adversely criticised the Council's action in proceeding with the sewerage plan at Lower Summerseat without the Board's sanction. The Council's explanation was that infectious diseases had broken out there.

THE Local Government Board has written the Coalville Urban District Council suggesting that owing to the opposition offered at the recent inquiry of the sewerage scheme to the site selected for the disposal of sewage from the Whitwick Ward owing to its close proximity to the populated portion of the parish of Thringstone, the sewage from the part of the district in question should be pumped to the site at Kelham Bridge. If, however, the District Council considered more than two outfall sites were necessary or desirable, the Local Government Board requested that the site selected for the treatment of the sewage for the area in question should be quite away from the immediate neighbourhood of the village of Thringstone. The Council has resolved that Mr. Everard prepare amended plans and rough estimates with respect to the Whitwick portion of the scheme, and consult the Sewage Committee after seeing the inspector (Major Tullock) thereon.

A LOCAL Government Board inquiry has been held at Skircoat with regard to an application by the Halifax Rural District Council for power to purchase a site for the treatment of the sewage of the parish of Skircoat.

A LOCAL Government Board inquiry has been held at Rhymney into an application by the Urban District Council for power to borrow a sum of £10,000 for the purpose of carrying out a system of sewerage and sewage works for the district.

IN consequence of an unfavourable report upon the working of the sewage purification works of the Cleckheaton District Council in the Scholes Ward, the General Purposes Committee has decided to instruct Mr. Woodhead, C.E., of Bradford, to report upon the works. The system is that of irrigation.

AT a recent meeting of the Perthshire County Council a long letter was read from the Clerk of the Comrie Parish Council, enclosing supplementary report and plan by Mr. Copland, C.E., Glasgow, anent Comrie drainage, and asking the District Committee to contribute a proportion of the cost in respect of the surface water off the roads going into the drains. Under the new drainage scheme the cost is estimated at £1150, as against £3300 as at first proposed. The Council has not yet decided the matter.

AT a special meeting of the Morecambe District Council on the 14th inst., the twelve competitive schemes for the sewerage of the district were again considered, and eventually one submitted by "Forward" was adopted. This scheme will serve for a population of 60,000, including Bare and Torrisholme. The estimated cost of the works is £39,227 10s. 9d. (exclusive of way leaves, engineering, or land), with an estimated annual working expenditure of £620 2s. 6d., for a population of 45,000. To this must be added the cost of the "septic system," which has already been agreed to, and which will form a part of the scheme. The successful competitor is Mr. H. B. Nichol, C.E., of Birmingham.

WITH reference to the disposal of Thorne sewage, the four representative members of the District Council recently presented a report to be forwarded to the Clerk of the County Council. They point out that the main sewer, the "Boating dyke," is 1¼ miles in length, upwards of ½-mile, passing through the principal portion of the town, is arched over, and as to the open part, less than a dozen cottages adjoin it. The main sewer is regularly cleansed under the supervision of the Sanitary Surveyor, and has the advantage of being flushed from the upper end throughout the entire length by water from the canal. The sewage is carried by means of a land drain to Keadby, where it is discharged into the Trent. Dr. Arbuckle agreed that it was unnecessary to adopt a modern scheme for treating crude sewage, which in a district so low-lying as Thorne, would be very expensive. He had not been able to trace any definite sickness to the open sewer. The report was unanimously adopted and ordered to be sent to the County Council.

THE Harrogate Corporation has decided to work the pumps at the sewage farm, Ripon-road, by an electric motor in place of a gas engine.

A COMMENCEMENT has been made with the drainage of the eastern section of Newburgh, Mr. Stevens, the contractor, having placed a strong staff of men on the works. This contractor is also the lowest offerer for the Lochmill water scheme, which, it is expected, will be shortly put in hand.

AT a recent meeting of the Truro City Council the Sub-committee appointed to inspect Colonel Ducat's aërated bacterial self-acting filter for sewage purification at Hendon reported that they were of opinion that the filter was a further advance in the natural treatment of sewage, but the filter at Hendon was of such an experimental nature that they were unable to say whether it would carry out all that its authors professed, and, therefore, they awaited a further extension of the system with great interest.

AT the last monthly meeting of the Somerset Drainage Commission a deputation from the Langport Rural District Council presented a plan for the carrying of the sewage of Langport into the river Parret, which plan had received the approval of the Local Government Board, and to which the sanction of the Commissioners was asked. After considerable discussion the Commissioners decided not to give any answer in the case until the appeal against the judgment in the case against the Bridgwater Corporation had been decided.

A DEPUTATION from the Neath and Glyncorrwy District Councils recently waited upon the Local Government Board in reference to the direction given by the Board to carry out an elaborate and costly system of drainage for the Afan Valley. The circumstances of the case were fully explained, and the deputation were told that the Board would not insist upon a scheme being adopted by which the sewage should be carried to the sea, and that, possibly, the adoption of septic tanks or Ducat's sanitary system would meet the case. A Local Government Board Inspector would visit the district shortly and report.

SINCE the Alloa Burgh Commissioners purchased from Lord Mar his lordship's rights over the town's water supply, Gartmorn Dam, and also enlarged and improved the then existing waterworks at a cost of about £30,000, a coal pit has been opened in the vicinity of the dam, and the sewage from the mine has been allowed to pass into the loch after undergoing a process of settling in a large tank constructed for the purpose. Quite recently complaints have been made that the sewage pumped up from the pit and conducted to the dam was far from being free from pollution after leaving the settling tank, and the Burgh Commissioners have taken up the matter with the view of ascertaining whether the complaints are well founded, and, if so, taking the necessary steps to put a stop to the pollution. They have agreed that the Water Committee be asked to obtain an estimate of the cost of laying a sewage pipe from Sheriffyards Pit to the Brothie Burn.

THE Clerk to the Cheshire County Council has received an important Local Government Board communication in reference to a recent inquiry at Chester into an application for a Provisional Order constituting a Joint Committee to put into operation the Rivers Pollution Prevention Act in the basin of the river Dee. Opposition was forthcoming from the County Councils of Shropshire, Merionethshire, Denbighshire, and Flintshire. Whilst the Board is of opinion that the constitution of a Joint Committee is the best means of dealing with the situation, it is not willing on the evidence before it to issue such a Provisional Order as that applied for, and it suggests a further conference between the Councils interested.

THE Local Government Board inquiry was continued at Oakengates on the 19th inst. to take evidence in opposition to the order of the Shropshire County Council to form an Urban Council for the district of Oakengates. The Clerk to the Wellington Rural District Council said that body was quite competent to deal with the needs of the district, and had schemes in hand to provide for an adequate water supply to the district, and proper drainage. It was contended on behalf of the Wombridge Parish Council that an injustice would be done to it if included in the proposed urban district, inasmuch as it, while already being provided with a satisfactory system of sewerage, would be called upon to contribute towards a sewerage scheme for St. George's and other parts of the district at present without one. The inquiry was again adjourned.

Lighting.

THE Ossett Town Council has resolved to ask the Gas Company to reduce the price of gas from 2s. 9d. to the former price of 2s. 6d. per 1000 cubic feet.

A LOCAL Government Board inquiry has been held at Stratford Town Hall into the application of the West Ham District Council for sanction to borrow £11,573 for street improvements, electric lighting, and the erection of baths and washhouses.

THE Electricity Committee of the St. Pancras Vestry has decided that the electric light be extended to the whole of the Highgate part of St. Pancras, and the necessary work in connection therewith be carried out at an estimated expenditure of £7585.

THE City Council of Sheffield has decided to negotiate for the purchase of the Sheffield Electric Light and Power Company's undertaking on the terms of £220 of the Corporation 2½ per cent. Redeemable Stock for every £100 of the sum properly expended by the company upon their undertaking, and chargeable to capital account, providing that the amount of such capital expenditure shall not in any event exceed £112,000, any further expenditure properly made being repaid to the company, with 5 per cent. interest.

A LOCAL Government Board inquiry has been held at Longton into an application of the Corporation to borrow a sum of £20,000 for gasworks purposes.

THE Clerk to the Troon Commissioners has been instructed to apply to the Sheriff for powers to carry into effect the resolution adopting the Gas Supply Act.

IT is proposed to light Crieff with electricity through the aid of water power. The amount of capital required is said to be £8000, but the working expenses per year will be much under £1400.

A LOCAL Government Board inquiry has been held at Bexhill to investigate the application of the Urban District Council for a loan of £20,000 for the purpose of supplying electric light to the town.

THE members of the Elland District Council have under consideration the advisability of providing the town with electric light. It is expected if a scheme is to be adopted that one similar to that which is in operation at Nelson will be recommended.

AT a recent meeting of the Boston Town Council a resolution in favour of lighting the town by electricity was carried unanimously, and a strong feeling was expressed that in November next a Provisional Order should be applied for. The cost was estimated at £20,000, and it was contended that, including a sinking fund, the system could be adopted for £800 per year, against £956 now paid for gas.

THE Marylebone Vestry is anticipating erecting a dust destructor to be worked in connection with an electric light station, for which it has already applied for a Provisional Order. At a recent meeting it was agreed that the question be referred to a special committee, consisting of the chairman and one member of the Works, Sanitary and Sewers, and Electric Lighting Committees, to consider and report as to the amount of land required, and the position thereof, for the purposes of a dust destructor, electric lighting station, and other purposes, and that the Vestry Clerk be instructed to write to Lord Portman asking him if he can sell land, and on what terms.

ON Thursday, the 13th inst., an important conference took place at the Municipal Offices, Liverpool, between the Tramways and Lighting Committees. The conference considered a series of proposals made by Mr. A. B. Holmes, Electrical Engineer of the Corporation, outlining an important scheme for extending the electric supply, with the view, not only to meeting the electric tram service, but of lighting the cars, extending electrical street lighting, and supplying electrical energy to users of machinery. The proposals included the establishment of a large new electric generating station on a site near the Leeds and Liverpool Canal, the outlay estimated at £150,000. Eventually the proposals were referred to Dr. Hopkinson, who was asked to report upon them.

A SUB-COMMITTEE of the Aberdeen Town Council recommends that the present lamps in front of the Municipal Buildings and in Castle-street be fitted with the electric light.

THE proprietor of Fort William Gasworks, Mr. Hugh Mayberry, Glasgow, has intimated that the gasworks will be discontinued at the end of this month. In consequence of the stoppage Fort William will now depend entirely on electric light for illuminating purposes.

THE Town Council of Leith has accepted, at £8844, the tender of the India-rubber and Gutta-percha Company, of Silvertown, London, E., for the supply and erection of steam dynamos and accessories, switchboard and storage batteries, required in connection with the electric lighting scheme.

THE members of the Electric Light Committee of the Whitechapel District Board of Works paid a visit a few days ago to Brighton for the purpose of inspecting the electric light installation in that town. They were entertained by Mr. J. Harris, C.C., J.P., the chairman of the Board, and Mr. Morris Abrahams, L.C.C.

AN inquiry is about to be held by the Local Government Board to consider an application by the Barking (Essex) District Council to borrow sufficient money to enable them to lay down an electric light installation for the purpose of lighting the town with electricity. Although Barking is only eight miles from the General Post-office, it has a population of 20,000, and contains, in addition to a local gasworks, Beckton Gasworks—the largest in the world—the town has been lighted with oil lamps ever since 1875, when, owing to a dispute with the gas company as to price of gas, the supply was cut off, and the town has ever since been lighted with oil.

Correspondence.

We do not in any way hold ourselves responsible for opinions expressed by our correspondents.

THE SANITATION OF COWSHEDS, DAIRIES AND MILKSHOPS.

(*To the Editor of* THE SANITARY RECORD.)

SIR,—In an article on this subject by Dr. Kaye, published in your issue of the 14th instant, he suggests that as an aid to effecting necessary reforms in cowsheds "the official undertaking this work should be prepared with a sketch," and he gives a sketch which any person could have drafted from information derived from any one of half a dozen cheap text-books. I suppose "the official" means the Inspector, it can mean no one else.

For although Public Health law gives to the Medical Officer of Health, specially and generally, all the administrative powers of an Inspector, the profession has long ago succeeded in emancipating its members from all the uncongenial duties they are liable to be called upon to perform in respect of procedure against individuals, which ought to be left to a "well-trained Inspector" (*vide* a well-known handbook by a rural Medical Officer of Health, and another by a metropolitan professor to much the same effect). We Inspectors have had enough and to spare of advice by practically irresponsible advisers of what ought to be done. We are, or, rather, we should be if we were not careful, the catspaws, or scapegoats, or both, of a system of administration of the law by local option—a system in which every one concerned has an interest in exerting authority without incurring responsibilty. The legislation by which alone Dr. Kaye's proposed reforms are to be effected, if effected at all, is a farce; for it seeks to put on the "occupier," often a yearly tenant, the onus of effecting structural improvements that ought to be executed by the owner.

It would not make much difference if this were altered. Any active and conscientious Inspector who should manage by any means to induce his Board to support him in carrying out the law would simply be preparing a rod for his own back. The Board would be turned out at the next election, and the "official" after them. Any amount of nicely-executed sketches will not save him.

If the public desire such protection as the law in its present condition would afford them they must protect the administrators by securing to them reasonable security of tenure of office which we have been long fighting for. Imperial interests cannot be wholly left to elected Boards; the local option system is a failure, especially in rural districts. It will be said that public opinion will not stand it. Be it so; then the public cannot have the protection of the law. The community cannot have both the enjoyment of a degree of liberty amounting to licence and the benefits flowing from the exercise of well-regulated authority.

If Medical Officers are really in earnest, why do they not practise as well as preach? They have the power—never used—of reporting John Brown or Peter Jones for a specific contravention of a given law, but they will neither lead nor follow nor stand out of the way, confining themselves, as in the article under notice, to educating "the people" to demand of us that which they well know we cannot perform.

It seems a bold thing to say that one great factor militating against sanitary reforms arises from the attitude of the profession by which such reforms are most advocated, but everyone conversant with the minor working of the public health service knows it to be true, and it is a fact that can be proved to the hilt from the writings of the leaders of the profession.

The root of all sanitary reforms is first protection for the Inspector; secondly, that the Medical Officer must either practise that which he preaches or be formally divested of all control of administrative work which has to be carried out on the Inspector's responsibility—work in which the Medical Officer of Health takes no part. No "official" can unite the functions of a missionary and a commercial traveller with those of an administrator holding a certain degree of authority—the one destroys the other. BALAAM'S ASS.

CAMBORNE.—The Medical Officer of Health has reported an outbreak of typhoid fever in this district.

Notes and Queries.

[Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C.]

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

936.—ALCOHOL: ITS USE AND ABUSE: BOOKS ON.—"R. W. K." writes:—"With reference to Query 918, your correspondent would find the following books on alcohol and the temperance question 'up to date,' viz.:—(1) 'The Scientific Temperance Handbook,' by Professor Cheshire, F.C.S., &c., price 3s.; (2) 'The Truth about Intoxicating Drinks,' by E. R. Barrett, B.A., price 2s. 6d.; (3) 'The Case for Total Abstinence,' by W. J. Lacey, price 3s. 6d. The above three books are all prize works, and are bound alike as a set. (4) 'Alcohol and Public Health,' by J. James Ridge, M.D., M.O.H., price 2s."

Answer.—We are extremely obliged to our correspondent for the information, which, we have no doubt, will be most useful to our correspondent. The books may be obtained from the Sanitary Publishing Company on receipt of the published price.

937.—HYDRAULIC MEAN DEPTH IN CIRCULAR SEWERS: HOW TO DETERMINE.—"E. H. Q." writes:—"I should be obliged if you would enlighten me as to how the hydraulic mean depth in circular sewers is always $\frac{1}{4}$th $\left(\frac{D}{4}\right)$ the diameter when the sewer is running either full or half full. I have carefully followed 'Notes and Queries' on this subject, but cannot arrive at a satisfactory result. For instance, my working out of the H. M. D. of a sewer 2ft. in diameter is thus:—

$$\text{H. M. D.} = \frac{\text{Sectional area}}{\text{Wetted permeter}} = \frac{\text{Area of circle}}{\text{Length of circumference}} = \frac{D \times D \times \cdot 7854}{D \times 3 \cdot 1416} = \frac{2 \times 2 \times \cdot 7854}{2 \times 3 \cdot 1416} = \frac{2 \times \cdot 7854}{3 \cdot 1416} =$$

$\frac{1}{2}$ diameter, *i.e.*, $\frac{D}{2}$."

Answer.—We described in our answer to Query No. 878, in our issue of November 26th last, how to obtain the hydraulic mean depth, the rule as to which is:—Divide the sectional area of the stream by the wetted perimeter. As we have also pointed out previously, the hydraulic mean depth of circular sewers when running full or half full is $\frac{1}{4}$th the diameter. For brevity we take up our correspondent's working as follows:—

$$\frac{2 \times \cdot 7854}{3 \cdot 1416} = \cdot 5\text{ft., and } \frac{\cdot 5\text{ft.}}{2 \cdot 0\text{ft.}} = \frac{1}{4}$$

the diameter of a 2ft. sewer.

938.—DRAINAGE OF HOUSE: POWER TO REQUIRE DIVERSION OF DRAIN.—"M. S." writes:—"The drain from one house in my district runs under the dwelling and joins the sewer in the front street. I find it defective, as the sewage leaks into the cellar of adjoining property. There is a public sewer at the back, and the drain could be diverted into this. Have the Sanitary Authority power to order the owner to divert it into this, and thus abate the nuisance?"

Answer.—If the existing drain is insufficient in itself, by reason of defective construction, the Local Authority, if satisfied of its insufficiency, may require the owner, under Sec. 23 of the Public Health Act, 1875, to provide a sufficient drain to empty into any sewer which the Local Authority are entitled to use, and which is not more than 100ft. from the site of such house. In this case the Local Authority may require the drain to be connected to the public sewer at the back of the property.

939.—HOUSE DRAINAGE: LOCAL AUTHORITY TO DETERMINE QUALITY OF MATERIALS.—"M. S." writes:—"In this district the Model Bye-laws as to New Buildings are in force, but there are many old houses where the lead waste pipe from the sinks has a 'bell' or a 'D' trap. If I find these defective can I in serving notice on the owner require him to use a proper stoneware gully, or is he at liberty to use what kind of gully he likes?"

Answer.—This is not a case where the Model Bye-laws as to New Buildings apply, but one of defective drainage, proceedings as to which may be taken under Sec. 23 or Secs. 91 to 96 of the Public Health Act, 1875. If the drainage is insufficient by reason of the waste pipe from sink being improperly trapped and disconnected, the Local Authority may serve a notice under Sec. 23 of the Public Health Act, 1875, to provide a sufficient drain. They should describe the materials to be used, and the Local Authority have the exclusive power of deciding whether their directions are complied with in regard to the materials to be used. In Austin *v.* The Vestry of Lambeth, 4 Jur. (N. S.) 274, the Vestry ordered a drain to be made with pipes of stoneware of the best kind and quality, and the builder laid down Aylesford pipes, but the Vestry declared that these were not stoneware, and proceeded to remove them. Stuart, V.C., held that it was for the Local Authority to determine the question, and refused to grant an injunction against them on motion, and this decision was confirmed on appeal.

940.—EXAMINATIONS FOR LOCAL SURVEYORS: HOW HELD.—"R. E." writes:—"Would you please let me know whether there are now any examinations held for Local Surveyors, also the fees for such?"

Answer.—Examinations for Local Surveyors were formerly held by the Sanitary Institute, but these have been discontinued. The Incorporated Association of Municipal and County Engineers, however, now hold examinations for Local Surveyors, the secretary of the Association being Mr. Thomas Cole, 11, Victoria-street, Westminster, S.W., from whom a copy of the syllabus may be obtained. The fee for the examination is three guineas.

941.—LEAD CISTERN: LEAKAGE FROM: PRESERVATIVE FOR CISTERN.—"A Subscriber" writes:—"Could you tell me of any substance or composition with which to coat a lead storage cistern to prevent leakage? The cistern is fixed on the joists of the roof, and it cannot be got down or another cistern put up without taking down the gable end. Curiously, the water is of a very hard nature, but still it affects the lead. The water is not used for drinking purposes. Could you tell me of any composition to stop the action of the water?"

Answer.—It would have been useful to have been furnished with more detailed information than that supplied, in order that we might advise definitely. Is the cistern a lead-lined wooden cistern, and, if so, where and how does leakage take place? Does it come through the face of the sheet lead, or does it arise from the defective jointing or construction of the cistern? It is possible that it may arise from the lead having decayed, but we think it is much more likely to be due to other causes, as to which careful examination should be made, and if our correspondent is still in difficulties, if he will further communicate with us, we will endeavour to advise him.

We gather that the cistern rests on the ceiling joists. But it is incorrect to say that "the cistern cannot be got down, or another cistern put up, without taking down the gable end." If there is access, and room for the plumber to work in the ceiling, the old cistern may be removed and a new one erected, the woodwork for the new cistern being put together in the ceiling, and afterwards lined with lead. We are unable to determine what is meant by hard water affecting the lead. Does the hardness arise from carbonates of lime or magnesia, or from a sulphate, chloride, or nitrate of lime or magnesia? The lead may be coated as a preservative with (1) Torbay or other oxide of iron paint in three coats; or (2) coal tar, boiled till the watery vapour and naphtha are expelled, and mixed when cold with half a pint of naphtha, and the same of boiled oil, to each gallon of tar.

942.—Book on Sanitary Law for Surveyors' Examinations.—"T. H. Q." writes:—"Will you kindly inform me which book you consider the best for rapidly acquiring a knowledge of the Public Health Acts for a candidate preparing for the examination of the Municipal and County Engineers' Association, viz., (1) Stratton's 'Public Health Acts,' or (2) Angell and Morley's 'Guide to Sanitary Legislation'?"

Answer.—For the special purpose required, we are of opinion that Angell and Morley's "Practical Guide to Sanitary Legislation," price 12s., will be found to be much more serviceable than an unannotated edition of the Acts, such as Stratton's "Public Health Acts." In the former the sections applicable to the duties of the surveyor are selected and annotated for him. The book may be obtained from the Sanitary Publishing Company.

943.—Factory and Workshop Acts: Limitation of Time for Proceedings.—"K. U. H." writes:—"Will you kindly answer me the following questions:—(1) What would be the limit of time for instituting proceedings under the Shop Hours Act, 1892? See Sec. 7 and also Secs. 89 to 91 of the Factory and Workshops Act, 1878. (2) Could a person aggrieved under the Act, *i.e.*, a young person or his father, institute proceedings against an employer for an infringement of the Act, without the intervention of the Local Authority or their Inspector?"

Answer.—(1) Summary proceedings for offences and fines under the principal Act (*i.e.*, the Factory and Workshop Act, 1878), as amended by any subsequent Act, are limited by Sec. 29 of the Factory and Workshop Act, 1891 (which is substituted for Sub-section 1 of Sec. 91 of the Act of 1878), to the information being laid within three months after the date at which the offence comes to the knowledge of a Factory Inspector, or, in case of an inquest being held in relation to the offence, then within two months after the conclusion of the inquest, so, however, that it shall not be laid after the expiration of six months from the commission of the offence. (2) We do not think so.

944.—Book of Tables for Plumbers.—"W. W." writes:—"Could you please tell me the full title and price of a book of tables for plumbers, joiners, &c., by Wright or Clarke?"

Answer.—The book required by our correspondent is, no doubt, Clarke's "Pocket-book for Plumbers, Architects, and Sanitary Engineers:" being a collection of tables and memoranda compiled by J. Wright Clarke, price 2s., and obtainable from the Sanitary Publishing Company post free on receipt of the published price.

945.—Inspector of Nuisances: Variation in Terms of Appointment: Advertisement.—"U. D. C." writes:—"Is it necessary for the Urban District Council to advertise in the local papers when they (1) increase the salary of their Inspector of Nuisances, part of whose salary is repaid by the County Council, or (2) if they make the appointment for five or any other number of years, and also increase the salary?"

Answer.—(1) and (2) An advertisement in a public newspaper is not now requisite under the circumstances.

946.—Municipal and County Engineers' Examinations: Books to Study.—"P. S." writes:—"Will you please say what books you recommend to be studied by a person wishing to pass the examination of the Municipal and County Engineers' Association?"

Answer.—If our correspondent will refer to our answer to Query No. 727, in our issue of July 9th last, he will find a list of the books recommended by us to be studied for this examination. Reference should also be made to our reply to Query No. 816, in our issue of October 8th last.

947.—Building Bye-laws: Limitation of Time for Proceedings.—"H. L." writes:—"Some few months ago some additions were made to the rear of a building which contravene Bye-law 54 in respect to the open space required at the rear of a building. No plans have been submitted. Will you please inform me:—(1) What is the time limit in which a Sanitary Authority can take action requiring the removal of such buildings? (2) Does the time commence to run from the time the building was erected or from the date of its discovery by the surveyor? I may add that the building has probably been erected some months, and the contravention consists in having covered a portion of the yard reserved for rear space with a glass roof."

Answer.—(1) and (2) Assuming that the dwelling was erected subsequent to the confirmation of the Building Bye-laws, the addition thereto of the building at the rear will be a continuing offence. In general, an offence against a bye-law must be the subject of summary proceedings within six months after it has been committed. But under Sec. 158 of the Public Health Act, 1875, the existence of the work in such a state as to be in contravention of the Bye-laws is a continuing offence, and in the above case this section seems to apply, so that there is really no limit of time within which proceedings may be taken.

Contracts Open.

The dates given below are the latest up to which tenders can be received.

Shalford (Guildford).—January 24th.—Scavenging.—Mr. Ferdinand Smallpeice, clerk, 138, High-street, Guildford.

Cleethorpes (Grimsby).—January 25th.—Scavenging.—Mr. Egbert Rushton, C.E., surveyor, Poplar-road, Cleethorpes.

Normanton.—January 26th.—Scavenging.—Mr. Eaton, inspector of nuisances, Council Offices, Normanton.

Normanton.—January 26th.—Sewer, &c.—The Urban District Council Offices.

Stockport.—January 26th.—Sewering.—Mr. John Atkinson, A.M.I.C.E., borough surveyor, St. Petersgate, Stockport.

Turton (Lancs).—January 27th.—Sewering, Paving, &c.—Mr. V. W. Laithwaite, surveyor to the Council, Public Offices, Bromley Cross, near Bolton.

Edinburgh.—January 31st.—Sewer.—Burgh Engineer, 1, Parliament-square.

Macclesfield.—January 31st.—Sewers, &c.—Mr. James Thorpe, surveyor, 19, King Edward-street, Macclesfield.

Pontywain (Newport, Mon).—January 31st.—

Drain.—Mr. Thomas Cadogan, 17, Provident-terrace, Pontywain, Newport.

KING'S LYNN.—February 1st.—Sewers.—Mr. E. J. Silcock, C.E , borough engineer, King's Lynn.

LONDON, E.C.—February 1st.—Reconstructing Sewer.—The Engineer's Department, County Hall, Spring-gardens, S.W.

CARLETON AND DARRINGTON (NEAR PONTEFRACT).—February 2nd.—Drainage Works.—Mr. J. Richardson, M.I.C.E., 5, Central Bank-chambers, Leeds.

Vacancies.

ASSISTANT ENGINEER (LONDON, E., January 22nd).—For the Whitechapel Infirmary, Vallance-road. Salary, £35 per annum, to be increased to £40. Application forms may be obtained at the office of Mr. William Vallance, clerk to the Guardians, 74, Vallance-road, Whitechapel, E.

ASSISTANT ENGINEER (January 27th).—Salary £200 per annum, with prospect of increase by increments of £20 per annum to £280. Messrs. Brown, 17, Tothill-street, Westminster.

ASSISTANT GAS ENGINEER (BRADFORD, January 31st).—For the Gas and Electricity Supply Committee. Salary £250 per annum. Mr. George McGuire, town clerk, Town Hall, Bradford.

ENGINEER (LONDON, S.E., January 31st).—For the Brook Fever Hospital, Shooter's Hill, Kent. Wages £3 per week. Forms of application can be obtained at the Chief Office of the Metropolitan Asylums Board, Norfolk House, Norfolk-street, Strand, W.C.

INSPECTOR OF NUISANCES, &c. (KETTON, STAMFORD, January 22nd).—Salary £100 per annum. Mr. R. M. English, 40, Broad-street, Stamford.

WATER INSPECTOR, &c. (JERSEY, January 29th).—For the Jersey New Waterworks Company, Limited. Mr. H. G. Foster Barham, secretary, 27, Broad-street, Jersey.

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THE

Sanitary Record,

JANUARY 28, 1898.

Notes.

A RECENT article by a writer in the *Pall Mall Gazette* describes very vividly what must be a perfectly appalling condition of things in the capital of Bohemia. The city of Prague is very old, it is very picturesque, it is one of the most beautifully situated cities in Europe—but it is also one of the most insanitary and pestilential. Unless the account before us is overdrawn, "insanitary" is hardly the fit word to describe the condition of the place. One is impelled to use much stronger adjectives. Imagine a system of sewers that date back for—we would not care to say how many—generations, utterly rotten, impregnated with the germs of disease, and all emptying their filth and their garbage into a river which, at low water, leaves their pestilential mouths exposed, to contaminate the air. The water of the river is so polluted that, says the writer, with a touch of grim humour, "the public are naïvely advised to use it sparingly as a beverage, and to prefer the supply from the town springs." But he proceeds: "A recent bacteriological examination of Prague springs showed that the water was just as undrinkable as that from the river—contaminated with the disease-spreading percolations through the rotten walls of the old city sewers, and for years consumed without the precaution of filtering having been thought of. Truly, 'water, water everywhere, nor any drop to drink'!"

THE worthy citizens are not blind to the danger of this state of affairs, and would like to provide themselves with an entirely new sewerage system, could they but find the wherewithal to pay for it. However, they have resolved to bestir themselves, and do something, and so they have commissioned an English engineer, Mr. Lindley by name, to prepare plans. Mr. Lindley has now executed his commission, and the plans have been approved of. That is the first step. It is at least something. The future development of the undertaking, and the most difficult part of it, is meanwhile wrapped in the tender veil of futurity. Let us hope that this brave attempt to redeem this historic city, the scene of the labours of John Huss, from the ravages of typhoid, and to place it in line with the modern requirements of sanitation, will meet with the success it deserves. Picturesqueness is all very well, but picturesqueness and typhoid do not go well together. In the nineteenth century, at least, we look for better things.

THE plague-spot of Prague is to be found chiefly in the Jewish quarters. There it is not drains only that are at fault. The houses are old and reek with disease. The very name of sanitation, it would appear, is unknown. For the Jews of continental towns are essentially conservative in their instincts, and are not easily moved by the mushroom-like notions, such as ideas of hygiene, that have sprung up so rapidly in this age of progress and characterise an up-to-date community. Their conservatism is well illustrated in the Jewish cemetery, which has been designated as the oldest graveyard in Europe, where their fathers have slept undisturbed for centuries. It is a sacred tradition with them that the repose of the dead shall never be disturbed by the sacreligious hand of "improvement," and so the tombstones accumulate, crowding upon one another, until they are slowly effaced by the gentle hand of time. But the houses of the Ghetto—the "old-world, sacred, pestilential Ghetto," as the writer calls it—of which Prague is so proud, are not to be suffered to enjoy the same immunity, for the ruthless hand of an "improving" Corporation has undertaken the demolition of many of these ancient hotbeds of

disease. Already about two hundred houses have been razed to the ground, and, given the necessary funds, the day is not far distant when the whole of that home of pestilence will be but a memory of the past.

THE action of the Great Western Railway Company in promoting a line of railway from Marlow to Henley, along the Berkshire side of the Thames, is exciting a good deal of feeling, and it is certain that the Bill will encounter strenuous opposition in the coming session of Parliament. The Thames Conservancy have decided to oppose the Bill resolutely, and they invite the co-operation of the riparian owners and others whose interests are affected. It is said that the line will destroy the beauty of some of the most beautiful river scenery in the kingdom, as well as impair the privacy of the residents. Setting aside the latter objection, which, in a question where the interests of thousands of the masses of the London population are concerned should not be allowed, undue weight, we think that the effect of the proposed line on the scenery has been very much exaggerated. The general manager of the Great Western Railway has pointed out that, as a matter of fact, the line has been specially designed so as to encroach as little as possible on the river scenery. It will be kept well back from the river, and at the points where it crosses at Marlow and below the regatta-course at Henley particular pains will be taken, by the construction of ornamental trellised bridges, not to disfigure the rustic beauty of the stream. And in no way will it interfere with the great annual regatta, its aim rather being to foster and increase it in popularity.

ON the general policy of such an undertaking as this we have frequently expressed our views. The scenery of the Thames is admittedly beautiful. Why then should it be reserved as the exclusive privilege of the favoured few who possess villas on its banks? The spirit of modern democracy recognises that the beauties of our country are the heritage of the people—not to abuse, but to enjoy. They minister at once to the mind and to the body; for in these days of city congestion, and the unhealthy conditions of city life, it is for the public good that the health-giving influences of the country should be accessible to all. And what greater boon could be offered to the toiling masses of London than the opportunity to escape at times from the suffocating atmosphere of fog and smoke to the purifying airs of the upper Thames, their own patrimonial river? The policy of opposition is rooted in selfishness. As a matter of fact, we believe that the results of railway enterprise in other chosen haunts of Nature in this country have belied the fears of pessimistic prophets. Can any one say that the beauties of English lakeland have been impaired, in spite of the preaching of Mr. Ruskin, since the days when Wordsworth sang their praise? Nature is still the same, but she may now be wooed by thousands whose lot is cast in city wall to whom she was previously inaccessible.

ON Saturday last Lord Rosebery opened a People's Palace in the East End of Glasgow, in the very centre of one of the most congested districts of the industrial metropolis of Scotland. In the course of an impressive speech the noble Earl referred to the great growth that had been effected within modern times in the sense of municipal responsibility. Time was when a city corporation confined itself to the purely administrative side of its duties, seasoned by occasional junketings and banquets, on the annual inspection of the waterworks, and so forth. But a more enlightened spirit now prevails, and it is recognised that the municipality is charged with the duty of caring, within certain limits, for the physical and moral welfare of the citizens. Municipal baths, wash-houses, gymnasia, parks, and gardens, are now provided by an enterprising community for the masses within its borders, as well as drainage systems and bodies of police. His lordship also contrasted the position of a Town Councillor with that of a Member of Parliament, and the comparison was not wholly to the advantage of the latter. Unfettered by the gags of party, or the imperious mandates of whips, the Town Councillor can enjoy a feeling of independence and individuality that is denied to the in rank and file Parliament; and the sense of usefulness that is thus engendered gives a dignity to municipal life that is often lacking in the larger and the prouder sphere.

THE eighth annual report of the Vegetarian Federal Union, which was submitted at the annual meeting last week, states that the jubilee of the Vegetarian Society was attained last year, and during the year a Jubilee Fund was inaugurated by the Vegetarian Society and the Vegetarian Federal Union, the funds, amounting to over £1400, being shared equally between the two organisations. By means of this fund a large number of jubilee meetings were held in different parts of the country, besides many meetings, conferences, and functions of a smaller character. A National Congress has been arranged to be held in London from September 11th to 18th, and an International Congress will be held in Paris in September, 1900. Vegetarian literature continues to flourish, and many new restaurants on vegetarian principles have been opened both here and abroad. The president, in moving the adoption of the report, pointed out that in London there were now as many as thirteen different societies, all thriving and growing in strength, most of which had been formed during the past three years. He referred with satisfaction to the fact that the great prejudice with which the movement had to contend at first had practically broken down; it was advancing towards the position which had been attained by the advocates of temperance, and he looked forward with hope to the day when vegetarianism would be recognised not only as a healthy mode of sustenance, but as one of the conditions of a pure and perfect life. But surely, we may be allowed to remark, *en passant*, only a man of extreme views would place vegetarianism and temperance on the same platform.

ONE interesting feature in the discussion was the stress that was laid on the importance of preaching the gospel of vegetarianism by means of practical demonstrations and cookery lectures, and it was stated that there was a growing tendency in the direction of establishing vegetarian cookery centres

in different parts of the metropolis. The average English cook is credited with the smallest possible knowledge of the art of cooking vegetables, the importance of which it is scarcely necessary to emphasise. To remedy this state of ignorance the Federal Union has undertaken to provide competent cooks to impart the needful instruction; the result of their action being that the London County Council has given them the privilege of sending out some of their cooks to give demonstrations in technical cooking classes. One need not be prepared to accept the whole doctrines of vegetarianism to admit that this step should be attended with the most beneficial results, from a health point of view; for the knowledge of how to cook vegetables properly, the chief staples of a healthy diet, is one of the most important branches of culinary education.

THE Mayor of King's Lynn has made an appeal to the public for further subscriptions to the fund for the relief of the poor sufferers from the typhoid epidemic. The calls upon the committee have been so numerous and continuous that, notwithstanding the exercise of the greatest caution and economy, the funds are reduced to a very low ebb. Only £1100 has been subscribed on behalf of nearly 500 cases, mainly among the poorer classes of the inhabitants, and even with the assistance of private charity by the more well-to-do of the citizens, the committee's power to relieve the sufferers has been most limited, and they have been quite unable to deal with the widows and orphans. The expenses of keeping up the Town Hall kitchen, which has been the means of providing thousands of hot dinners to poor patients, and supplying them with the nourishment they so much required, have been very heavy, and there are still numerous cases of great distress, and many convalescents to be helped, for all which money is urgently needed. May we express the hope that this appeal will meet with some response among our readers?

THE Water Committee of the Aberdeen Town Council have discovered a somewhat extraordinary state of matters in connection with an aqueduct leading from one of the city reservoirs. In consequence of a quantity of paraffin having found its way into the water a thorough examination of the aqueduct was made, and this disclosed the fact that the aqueduct was in a very leaky condition. Several cesspools were very near, if not directly above it, and an open drain was found actually to cross the conduit, which is only 2ft. 4in. below the surface. Further, a heap of rotting vegetable matter had been piled above a manhole leading into the aqueduct, while near by was a pit used as a dung receptacle. Not a very healthy state of matters! The Committee, however, put a cheery face on the business, and expect to remedy the mischief by a little judicious patching of the leaks. We trust they will not let the town in for an epidemic. A report on the structure is to be presented shortly to the Town Council by the Borough Surveyor.

TWO cases are reported from the Court of Session in Scotland involving questions of a landlord's responsibility for illness occasioned to the tenant's family by defective drainage in the one instance, and impure water in the other. In the first case the family suffered from typhoid shortly after occupying the house, and when the drains were tested (though that was not till six months after), a hole was discovered in one of the pipes. The tenant removed and sued the landlord for having let him a house that was not in a habitable or sanitary condition. It was pleaded in defence that the drains had been overhauled about eight years before, to the satisfaction of the city engineer, and there was no reason to believe that there was anything wrong with them now. The judge decided that there was no proof of fault except that there was a hole in the drain and there was no proof as to how the hole was made. He did not think a doctor's evidence was enough to prove bad drainage. He therefore gave judgment in favour of the defendant.

The other action was at the instance of Lord Inverclyde, and was an action for rent. In this case, certain members of the family suffered from diphtheritic, sore throat, which was alleged to be due to bad drainage or improper water supply. The water was examined by an analyst, and was condemned. As Lord Inverclyde did not take any steps to remedy the water supply, the tenant left, and declined to pay the rent, putting in a claim for damages. The proprietor said that the lease contained no stipulation regarding the water supply, and disclaimed liability, and the Court upheld his defence. We should have thought that the provision of a proper water supply forms an implied condition in the lease of a dwelling-house, even where there is no express stipulation on the subject. The landlord's obligation is to provide a house that is habitable, and therefore, sanitary; and surely, the condition of the water supply is one of the chief elements in determining whether a house is sanitary or not.

Poisonous Perspiration.—At the French Biological Society, M. Arloing has reported some interesting observations on the toxicity of human perspiration. He found as a result of making intravenous injections of natural perspirations, and also of prepared extracts of the same, that when the strength of the injection approached 15 centimetres per kilogramme in the case of the dog, and 25 centimetres per kilogramme in the case of the rabbit, death almost always occurred, generally within three days, though sometimes not for some weeks, when it followed upon a state of profound cachexia. The injection of one-sixth, one quarter, or one-third of the lethal dose led, according to his observation, to immediate and proportional effects. The toxicity varied with the environment of the subject which furnished the perspiration as well as with the mode of preparation of the extract. The perspiration secreted during arduous muscular toil is richer in toxic principles than that secreted during the ordinary circumstances of life, the degree of extra-malignancy amounting to 25 or 30 per cent. All things being equal, perspirations obtained by artificial means of sudation present a minimum of toxicity; but perspiration obtained from a subject who has suffered from retention of the secretion due to cold, is poisonous.

NOTES ON
PRACTICAL SANITARY SCIENCE.

By WILLIAM H. MAXWELL.

Assistant Engineer and Surveyor, Leyton Urban District Council, Author of "Drainage Work and Sanitary Fittings," "Ventilation, Heating, and Lighting," &c., Certificates of the Association of Municipal and County Engineers, and Sanitary Institute.

No. 46.—REFUSE DESTRUCTORS.

(Continued from page 65.)

Another arrangement of this furnace is shown in Fig. 10.

The *steam jet*, which plays an important part in the Horsfall furnace, forces air into the closed ashpit by means of surface friction at a pressure equal to ½in. of water. This steam, in passing through the glowing carbonaceous cinders, is said to have a "water gas" effect; it "becomes broken up and yields two highly combustible gases, viz, hydrogen and carbonic oxide, and such being afterwards burned in the atmosphere of the cells and in the service and main flues, most materially assist in raising the temperature and in consuming the noxious-smelling gases evolved from the fresh or non-charred town refuse, and aiding in these being changed into innocuous and non-smelling gases."[117] "It is not *claimed* that there is any actual direct gain of heat from the formation and subsequent decomposition of the water gas, but that the action has the effect of carrying the combustion onwards to a further point in the furnace than it would otherwise reach, thus consuming smoke and other combustibles, which would otherwise escape."[118]

As to the special feature in this furnace in the arrangement of the *flues and flue openings*, these, instead of being at the back, as in Fryer's furnace (in which the gases from the drying refuse pass away straight into the main flue) are placed in the front of the reverberatory arch, over the hottest part of the fire. Thus the gases given off by the drying refuse at the back have to pass over the hottest part of the fire (at a temperature claimed to be equal to 2000 deg. Fah.), and through apertures in a red-hot reverberatory arch, before they can escape. The flues pass along over the top of the reverberatory arch, and then down through cavities in the side walls to the main flue underneath. The furnace is therefore practically surrounded with hot gases, which have the effect of drying the green refuse.

In Horsfall's "improved design" a longitudina *trough or hopper* is provided at the back, into which the carts tip direct; but instead of a shoot being provided, as in Mr. Whiley's, to convey the refuse from the hopper to the furnace, the hopper is brought right down to the grate bars, and the opening at the back is made the full width and height of the furnace.

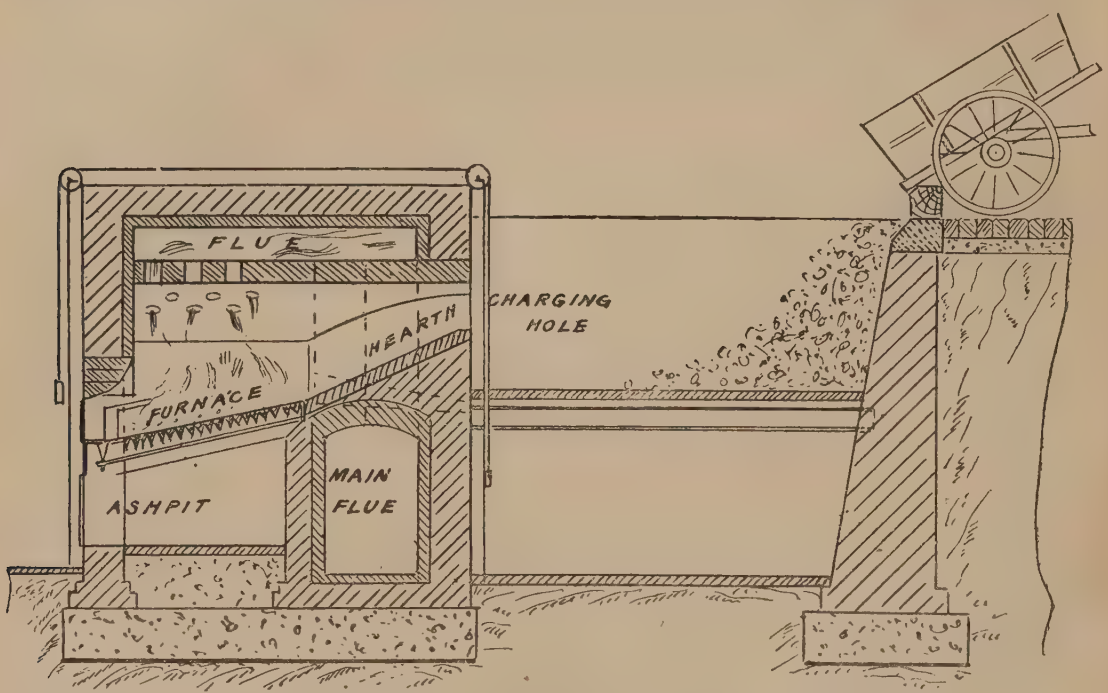


Fig. 10.

The *grate bars* in the improved furnace are Settle's patent,[119] and are of the rocking type without, it is stated, either excessive motion or wide spaces, those bars on to which the refuse first falls being dummies, *i.e.*, without air spaces. The motion is imparted by a small engine, the speed of which can be varied as desired. The *grate surface* proper is 28 square feet in area

[117] *Journal of the Society of Chemical Industry*, March 31st, 1896.

[118] *Health News*, July, 1895.

[119] Patent No. 15,482 (1895).

in each cell. The refuse is gradually moved forwards by a wave-like motion, and deposited in the form of clinker on the wide "dead-plate," where it remains until the attendant comes along to remove it. Thus, it is claimed, the continual admission of cold air to the furnace is avoided, and also less labour is required in raking the clinker off the dead-plate than in shovelling it up off the ground, while all handling of the refuse is obviated until after it has been reduced to clinker. With the use of these bars, it is stated that an output of nine tons per cell per day has been obtained.

There is a separate mattress chamber provided in connection with the main flue, so that large articles can be put into it whole and speedily destroyed.

In the working of the Horsfall destructor, some difficulty is said to arise "owing to the closing up of the comparatively small escape openings leading into the escape service flue, which is due to partial fusion of the brickwork at the high temperature and the adhesion of dust particles to the sides of the openings. The result is the reduction of the openings and draught, and the lessening of the power of the destructor, until the apparatus has been thrown out of work for repairs. Even when working properly, each cell is independent of every other cell, and if any heavy charge of green stuff be thrown in, the temperature of the cell may become materially lowered, so as to admit of foul-smelling gases passing away unconsumed for a time."[120]

The several small escape openings in the reverberatory arch above mentioned are now replaced by the larger opening shown in Fig. 8, which should remove the difficulty referred to.

THE SANITATION OF DOMESTIC BUILDINGS.

By Frank Latham, C.E., M. San. Inst., &c., Assistant Surveyor, Borough of Margate.

CHAPTER II. (*continued*).

Junctions with drains should always be at oblique angles. The Model Bye-Laws of the Local Government Board make a special note on this matter to the effect that "Tributary drains, whether vertical or horizontal, ought always to be formed with proper bends, delivering in the direction of the flow and at the side of the drain into which they discharge." (Fig. 7.)

This is necessary to prevent the interruption of the flow in the drain by a cross current, which would cause a deposit, probably eventuating in a stoppage. (Fig. 8.) In laying drains provisions should be made to give all junctions and bends an extra fall. A tributary drain should always be connected to a junction arm of the same size; thus a 4in. branch drain should not be made to fit into a 6in. junction arm, and so on. All junctions should be made slightly above the level of the invert in the case of house drains, and not, as is sometimes done, brought in at the top. It is often the case that when a drain passes close beside a gully, &c., for the pipes to be brought straight down and the junctions made in the top of the drain. This is a pernicious

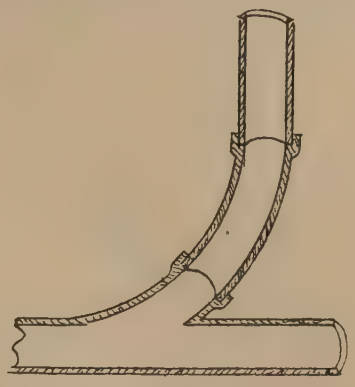


Fig. 7.

practice, and one to be condemned. Slow bends in connection with proper junction pipes should be used.

The junction of house drains with existing sewers should be by proper bends, the same as in the case

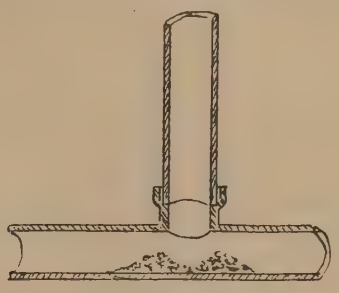


Fig. 8.

of drains and the practice of knocking a hole in the side or top of the sewer, and simply thrusting the end of the house drain into it and making good with cement, should be a thing of the past and aban

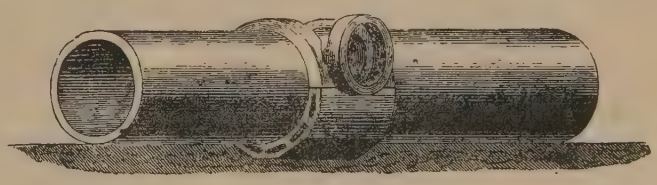


Fig. 9.

Fig. 9.

Fig. 10.

doned for the future. These connections should be executed with saddle pieces. (Figs. 9 and 10.)

Connections with brick sewers should be made

[120] *Journal of the Society of Chemical Industry*, March 31st, 1896.

by means of proper junction blocks specially manufactured for the purpose, care being taken that these are not turned in the wrong direction, as is not infrequently the case. (Figs. 11 and 12.) With existing iron sewers junctions should be made by boring the pipes to the size required,

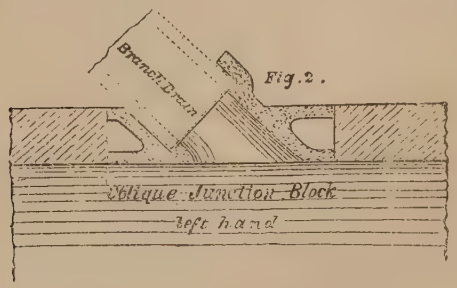


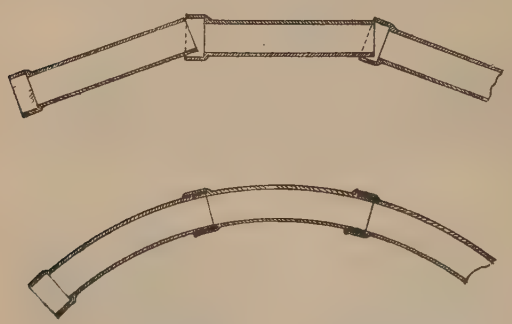
Fig. 11.

and proper connections made with saddle pieces. When it is necessary to have bends in drains, easy curves should be used, which can always be obtained, made in the same material as the pipes. (Fig. 13.) It is a gross mistake to form curves with straight pipes (Fig. 14) a method which is too often followed by some who know no better. The results in such cases are, that proper joints cannot be made owing to one side of the spigot

Junction Block.

Fig. 12.

being drawn nearly out of its socket in producing the required angle, while the other more or less closes up the cavity required for the cement joint, and thus only the top and bottom of the drain are able to be jointed, while the two sides



Figs. 13 and 14.

are imperfect, and at the same time impeding the flow.

When it is necessary to enlarge small drains in their course, taper pipes should be used, which are made, for instance, with a 4in. socket, and the pipe or barrel gradually enlarged to 6in., and so on, so that a drain can be enlarged at any required point without any unevenness or projection in the interior. The usual form of taper pipe is, however, incorrect; for instance, a taper enlarging a 4in. into a 6in. should be so formed as to bring the top of the 4in. lineable with the top of the 6in. pipe, the development being below the axis of the 4in., thus giving full advantage of the enlargement, otherwise when the 6in. is running full the sewage must back up into the 4in. Taper bends, when required for similar purposes, should also be advocated.

It is not an uncommon practice to make an increasing joint by thrusting the spigot of the smaller pipe into the barrel of the larger one and packing the joint in the ordinary manner between the two. This leaves a ridge or projection of more or less size in the inside of the larger pipe, which is not satisfactory. Another way is by cutting the barrel off within an inch or so of the socket of the smaller pipe and bevelling the inner edge of the spigot thus formed. This is then inserted into the larger pipe, the socket of the smaller one, in certain cases, fitting into the socket of the larger one, leaving just sufficient space between the two to make a joint. This method is a troublesome one, and not to be compared with that of purpose-made taper pipes. When stoneware pipes are required to be cut they should be stood on end and filled with sand, the inertia thus produced reducing the liability of fracturing or cracking the shell.

Sanitary Inspectors' Associations.

SOUTH WALES AND MONMOUTHSHIRE.

THE first annual meeting of the members of the above Association was held at the Town Hall, Newport, on Saturday afternoon, January 22nd, Mr. Edward Walford, M.D., D.P.H., of Cardiff, presiding. There were also present Dr. Herbert Jones, M.O.H., Rhondda, vice-president and hon. treasurer; Dr. Howard Jones, M.O.H., Newport, Mr. J. Towy Thomas, hon. sec. There was a good attendance of the members of the Association, which incidentally during the discussion of the rules was stated to consist of eighty members.

Mr. ROWLANDS, Pontypridd, raised the question of increasing the fee for membership from 5s. to 10s. per member, remarking that he hoped to see some benefit arising from the scope of the Association's operations, and he did not see how much could be done with such a small subscription.

Mr. HERBERT JONES, Rhondda, said he thought if they got no more than eighty members there would, after providing for the cost of printing the quarterly journal, be a small surplus at the end of the year. The rule was then allowed to remain as drafted.

The nominations were then proposed, as honorary members, of Dr. Howard Jones, Medical Officer of Health, Newport; Dr. T. Hall Redwood, Medical Officer of Health, Rhymney; Dr. J. W. Mulligan, Medical Officer of Health, Abersychan; Dr. Howard Davies, Medical Officer of Health, Pontypridd; Dr. George Neale, Medical Officer of Health, Barry; Dr. Edward Treharne, Chairman of the Committee of Health, Barry; and Dr. J. Griffiths Lock, Medical Officer of Health, Tenby.

Mr. A. P. PRESTON, Cardiff, read a letter from

the Sanitary Inspectors' Association with reference to the status and working of that organisation, and proposed a resolution that the secretary write to the London Association asking for a copy of the Sanitary Inspectors' Bill which is about to be brought before Parliament, and that the members of Parliament for South Wales and Monmouthshire be asked to support the same.

Mr. OWEN, Cardiff, thought the meeting should take no notice of the letter, as at Cardiff they were unanimous that the South Wales Association should not be affiliated with the London Association. Ultimately the meeting decided to allow the letter to lie on the table, and Mr. Preston waived the moving of the resolution, which accordingly fell through. The President of the Association, Dr. William Williams, Penarth, who was unavoidably absent, wrote intimating that the presidential address would be delivered at the next meeting, to be held at Swansea in April. Succeeding meetings were fixed at Barry in July and at Merthyr in October.

Mr. SPENCER JONES, Chief Sanitary Inspector, afterwards read a paper on "Meat Inspection," which dealt exhaustively but concisely with the various diseases of animals, and how meat of animals so diseased might be identified. Specimens of "fluke," the hair-like worm in pigs producing trichina, &c., were handed around preserved in bottles. During the past year 2059 lb. of beef, 794 lb. of mutton, and 627 lb. of pork had been condemned in Newport.

The CHAIRMAN, in thanking Mr. Jones for his paper, said meat inspection could hardly be carried on properly in the absence of public slaughter-houses under municipal control. Even then, unless private slaughter-houses were abolished, the difficulty was not overcome. He was rather astonished to find, out of thirty-three large towns to which he had occasion to write for information, that there were only two (Burnley and Cardiff) where private slaughter-houses had been abolished. He thought the proper person to decide on unsound meat was a veterinary surgeon, and he was glad that his own Authority had been able to see their way to the appointment of a veterinary surgeon, whose appointment had been very beneficial.

Mr. W. J. HUGHES (Rhondda) favoured the appointment of Sanitary Inspectors directly under the Government.

Mr. JOHNS (Pontypridd) said the difficulty in his district was that there were many private slaughter-houses which could not be closed without compensation.

Dr. HOWARD JONES said there were ten private slaughter-houses at Newport which it was hoped would be closed on the falling in of leases.

Mr. LEYSHON (Barry) said that in that district "blown" veal was forbidden by a clause in the local Act.

Mr. SPENCER JONES, replying to the vote of thanks, said he hoped that Sanitary Inspectors would study the question of meat disease, and not allow what was a purely sanitary matter to pass into the hands of veterinary Inspectors.

The members of the Association afterwards were entertained to tea by Dr. Williams, the president, who came to the meeting at the close of the proceedings and was heartily welcomed. In reply to Mr. W. Williams (Chepstow), Mr. Vaughan (Cardiff) stated that the matter referred to in Mr. Preston's waived resolution had been under the consideration of the Council and would receive their close consideration. Of course the Council could not have foreseen that the resolution would be dropped.

WOMEN SANITARY INSPECTORS IN GLASGOW.

As the suggestion that women should be appointed as Sanitary Inspectors in Edinburgh has aroused considerable interest, an *Edinburgh Evening News* representative called on Mr. Peter Fyfe, F.R.S.E., at the Sanitary Chambers, Glasgow, for the purpose of ascertaining the actual work done by women in this direction in that city.

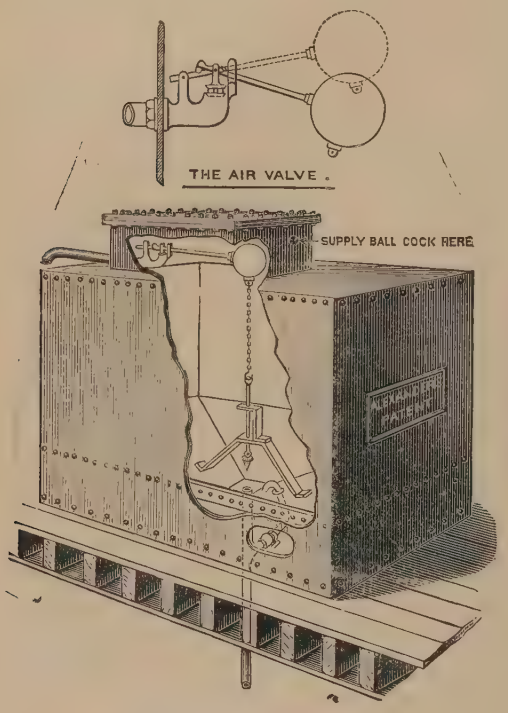
"We have," said the Chief Sanitary Inspector, "six female Inspectors in this department, but they have not the status of Sanitary Inspectors. They were first appointed about twenty-five years ago, and, so far as I know, Glasgow is the only place in Scotland where female Inspectors are employed. The age of our present female Inspectors varies from twenty-eight to fifty-five. When they were first appointed there was no age limit fixed, but we prefer them now to be between twenty-five and thirty-five. Their qualifications for the post are ascertained by an examination which I personally put them through as to their knowledge of domestic hygiene and the health laws applicable to this city and Scotland in general. General education, of course, is an important part. The work they are engaged in is the inspection of houses of the lower-class population. Where the floor, walls, ceilings, &c., are found in a dirty state the occupiers are warned, and if no improvement is found on re-visitation a statutory notice is issued calling upon them to have the work done, otherwise a penalty will be imposed. The female Inspectors also note in their books any nuisances or cases of infectious disease discovered in their district. These are intimated to the male Inspectors, in order to be dealt with by them. There are some of the female Inspectors employed at present in workshops for general inspection. Their hours of work are nine a.m. till five p.m. (one p.m. on Saturdays) with one hour for dinner. The city is divided into six districts for the women Inspectors, and they work immediately under the supervision of the district Inspector; they are, however, responsible to me, not to the Medical Officer of Health. Their wages are £1 a week, and there has been no advance granted during the past fifteen years.

"We have not gone further than this at present in the employment of women as sanitary Inspectors," said Mr. Fyfe in conclusion. "I am afraid, as a rule, their want of technical training will greatly debar women from taking in hand the structural part of a Sanitary Inspector's work; that is to say, with the inspection and supervision of drainage works, and special means of ventilation in workshops, public places, and dwelling-houses. I find also from experience that they are more susceptible to the ordinary wear and tear of such a life than men are, and are not unseldom absent from duty through ailments of one kind and another. For the more domestic part of the Sanitary Inspector's duty, they are, I think, well enough fitted, and by constant visitation exercise a wholesome influence upon those housekeepers who are more or less continually in a state of confusion and dirt. They are also useful for detecting overcrowding."

A SANITARY CISTERN AT LAST.

SOMETHING ABOUT THE INVENTOR AND THE INVENTION.

We have had to wait a good long time for the sanitary cistern, but it has arrived at last. And it has not only arrived, but what is more important still, it has come to stay. Its inventor, it is worthy of note, is neither a plumber nor a sanitary engineer, but a veteran Sanitary Inspector, Mr. Hugh Alexander, a gentleman who enjoys the proud privilege of having served the vestry of Shoreditch in the capacity of chief Sanitary Inspector for the past twenty-five years. Probably few Inspectors in the metropolis have witnessed more striking changes in the course of their official capacity than Mr. Alexander, and certainly in no part of it has



municipal enterprise moved so fast as in Shoreditch. To visit the parish now is to visit a spot where order has been evolved out of chaos. Where the wildest rookeries imaginable once clustered open spaces and model dwellings abound. Where the dull glimmer of uncertain gas once flickered in the streets the electric light evolved from parish refuse now penetrates the gloom; public baths and wash-houses, public libraries, and other signs of improvement and progress all testify that the spirit of enterprise has been abroad in what was once considered one of the most hopeless slum districts of the metropolis.

The post of chief Sanitary Inspector during this period of transition has, it may well be imagined, been far from a sinecure, nor have Mr. Alexander's experiences (which, by the way, we intend to invite him sooner or later to relate to our readers through these columns) been without their periods of anxiety. But he has come out of the ordeal with flying colours, and to-day there is probably no official in the parish who enjoys greater popularity. Mr. Alexander was for many years chairman of the Sanitary Inspectors' Association, in which position he enjoyed the friendship of Dr. Benjamin Ward Richardson, and the progress made by that body owes much to his sound judgment and broad-minded views. So much for the inventor. Now for the invention.

We presume that no one will contend for a moment that the cistern in common use is absolutely perfect. It is quite certain that no such contention will emanate from a Sanitary Inspector, or, indeed, from any person who has had to do with the zinc boxes—for they are nothing else—which builders find a pleasure in fixing up in the most inaccessible parts of our modern jerry-built villas. Who has not at some time or other been brought face to face with one of these abominations, mud an inch deep at the bottom, and a coating of black scum that could be felt on the top? And the average householder goes on drinking his water in spite of it, lulled into a false security by the fact that an analysis of the company's water has been made by Professor So-and-So, and pronounced absolutely germ free and pure. To quote Mr. Alexander:—"However pure water may be as supplied by public mains, it is always more or less polluted in cisterns before it reaches the consumer's lips." And herein lies the *raison d'être* of his invention, which he contends—and in which contention he has the support of the Shoreditch Vestry, who have by a unanimous vote adopted it, the Vestry's architect, and last, and we hope not least, The Sanitary Record—cannot fail, if properly introduced to public notice, to relegate the old-style cisterns into the limbo of sanitary antiques.

We have recently had the pleasure of examining one of these cisterns of 300 gallons capacity, and our views are quite in accordance with those of Mr. Rowland Plumbe, Architect to the Shoreditch Vestry, who describes it as self-cleansing, and adds that, "altogether a perfectly safe and sanitary storage of water is obtained, and that it is a very valuable addition to the many sanitary appliances which of late years have been introduced into house building." The cistern, which formed the object of a demonstration for our special benefit, is, we gleaned, constructed of galvanised iron, and the water is protected from pollution by the cistern being enclosed, only sufficient air being admitted—into a small air-box which is attached to the top—by way of vent, to allow of a free withdrawal of water, and, on withdrawal ceasing, the outer air is again shut off by the action of a very ingenious automatic air valve, by which arrangement also all pressure from the main is precluded. This absence of pressure is a considerable advantage, as the cisterns may be made of any size, and of any shape, without apprehension as to danger that would otherwise arise from the heavy pressure prevailing in some districts. By the same arrangement a warning is automatically given to the householder when the main is shut down, or when the service is in any way suspended. The bottom is sloped from all sides to the outflow, so that no deposit can accumulate. The mechanical construction throughout is of a simple character, as will be gleaned from the appended illustration; and although the cost of the cistern is necessarily a little more than that of the cistern now in vogue,

the advantages are such as to override this objection—if it can be called an objection—a thousandfold.

In conclusion, we commend Mr. Alexander's invention to the notice of Local Authorities generally, and we may add that we do so simply because we have the fullest confidence in its merits, and not only believe it to be the nearest approach to the ideal cistern which has as yet been evolved, but a cistern which has only to be widely known to be generally adopted.

FOOD AND HEALTH: WHAT PEOPLE SHOULD AVOID.

UNDER the auspices of the Glasgow Dairymen's Association, Dr. Robert Bell, Glasgow, delivered a lecture in the Religious Institution Rooms, Glasgow, on the subject of "Food and its Relation to Health." There was a good attendance, presided over by Councillor Gray, who said the health of the community was one of the first questions. In Glasgow they had managed, by observing this fact, to reduce the death-rate considerably. He might mention that the death-rate of Glasgow during 1897 was 22 per 1000, in Manchester it was 23, and in Liverpool 24. Milk had a very important relation to the health of a community.

Dr. Bell alluded to the digestion of foods, and said the more simple the diet the greater were the prospects of health to the individual. It should be borne in mind that people always ate more than was necessary to maintain the general health of the body. This violation tended to indigestion. Over-indulgence in eating was equally as injurious as over-indulgence in alcohol, although the results of that might not be so apparent. Vegetables should be taken fresh, if possible, for he maintained that as a nutritive agency beef tea was of no value whatever. Broth was another food which possessed few nutritious qualities. These gave rise to flatulency, and he had often people coming to him under the impression that they had heart disease when their trouble was caused by their stomachs distending and pressing against the heart.

He next touched on the question of cooking food, and after dwelling on its importance, said it was pitiful to see so many young women wasting their time in cycling—which had a most pernicious effect on their health—instead of attending to their domestic duties. To maintain health it was absolutely necessary that a variety of food should enter into the dietary of every individual. Milk contained all the nourishing elements sufficient for the health of the body, and he mentioned as a proof of this that the Arabs, who were the longest-lived people in the world, subsisted almost entirely on milk. In the treatment of Bright's disease and fevers generally there was no more valuable agent at the command of the physician than a good supply of milk.

A number of questions were answered, and the usual votes of thanks terminated the proceedings.

HUNTINGDON.—A very even death-rate has prevailed in this borough for the past seven years. The average for the period is 63·5. The deaths occurring in 1897 numbered 64, or a rate of 14·6 per 1000 inhabitants.

Institute of Sanitary Engineers

(*Continued from page* 73.)

Those were the difficulties our Government had to contend against during the Indian plague. Some actually secreting the bodies of those who died of this terrible plague amongst the living, rather than the Authorities should know the disorder was in the house. And yet the nation of people under consideration willingly subjected themselves, and gave every facility to the priest for inspecting their houses, their clothing, and their bodies.

Since the passing of these Acts in England great stimulus has been given to all sanitary reform. Where are the appalling epidemics of diseases as experienced in former years? Take the Maidstone one as the most serious experience for some time; yet, by careful isolation and prompt action, the Authorities prevented what might have been even much more serious.

So far, we have only dealt with the Jewish laws regarding the body. Yet they possessed a law for houses to be disinfected, and evidently in a most systematic manner. What the leprosy in house and in the clothing was I am not quite prepared to say. Some say it appeared first in the house, then in the clothing, and lastly in the person. Certainly if our modern scientific experts tell us that the clothing taken from a room where an infectious disease may have broken out, or the bed upon which the patient may have lain should either be put into a hot-air disinfecting chamber to kill the germ, or destroyed by fire, or a house should be thoroughly cleansed and disinfected, and yet nothing is visible in appearance.

It will not then be difficult to believe it possible that leprosy would cling or attach itself to a house which evidently was plastered, and probably size or some animal or vegetable matter mixed with it. Nor yet would it be difficult to understand it attacking the garments which were worn. The care and means taken to cleanse and purify infected clothing and houses was surprising. Clothing was generally burnt—a most effectual way of stamping out a plague.

In the houses the floors and walls were scraped, washed, and re-plastered; all that was scraped off was carefully carried outside the camp or city. If, however, it again appeared, the walls of the house were pulled down and the *débris* carried away.

There was no evidence to show whether this leprosy in the walls appeared similar to our fungus, which, we know from experience, when once it gets a hold, spreads rapidly, and as it spreads, frets or eats away the part attacked. A few years ago, in making a sanitary alteration in a mansion-house in Scotland, I found that the fungus had spread from the basement up behind the lath and plaster, eating away the wood lintel and woodwork in general, in some parts actually reaching a portion of the lower roof. I thought a word about this might raise a profitable discussion. Experts tell us that air is required, which I quite believe, yet you must have noticed it growing outside, where a free circulation of air was obtained. I have noticed old floors taken up which must have been down at

least thirty or forty years, and no trace of the growth. Yet a new floor, under the same and sometimes more favourable conditions, entirely eaten away within twelve months. I sometimes think the wood itself has something to do with its generation.

One other matter which must strike us, was the means employed to cleanse the camp or city of any nuisances. All animal or vegetable refuse was ordered to be either burnt by fire or carried outside the camp. When we consider the number of people which, according to history, is 600,000 fighting men above twenty years of age, along with the women and those below twenty, would give us an aggregate total of at least two million people.

The disposal of nuisance and excremental matter to such a number of people would, in the present day, be a most serious and important item. This I may say appears to me one item in which we have made most rapid strides, in the disposal of refuse and sewage matter, owing, no doubt, in a great measure to the fact that the nation has made it worth the while of men of capital, men of energy, and men of brain, to spend their lives in searching out, and inventing methods, and manufacturing machiney, capable of being utilised for such purposes.

The Jewish people had a very primitive method. "Thou shalt have a place also without the camp, whether thou shalt go forth abroad." "And thou shalt have a paddle upon thy weapon; and it shall be when thou wilt ease thyself abroad thou shalt dig therewith and shall turn back and cover that which cometh from thee."

This, I think, is quite suggestive enough, without further explanation, but certainly much more preferable to an old law which existed in London, as follows:—

"No man shall cast any urine or ordure-boles into the street before the hour of nine at night. And also he shall not cast it down, but bring it down and lay it in the channel, under the pain of three shillings and fourpence.

"And if he do cast it upon any person's head, the party to have a lawful recompense, if he be injured thereby."

Pedestrians must certainly have had a lively time dodging the contents of these utensils.

I have now to touch upon the food laws. These people have always been looked upon as very shrewd, and there are one or two points which give us a sidelight which identifies them with their present offspring. They were prohibited from eating that which had died in the field—it was to be destroyed—only they were allowed to sell it to strangers outside the camp. There are still a number of people who believe in this Act. Many a farmer knows the law prohibits him from sending the same to market, nor yet would he eat it himself, yet would not hesitate to sell it to some unscrupulous party to re-sell. Where, or how, he asks no question, for conscience' sake.

As regards swine flesh little need be said, while we may all like a little pork, or rasher of bacon for breakfast, yet, nevertheless, to see the beast feed, and especially in Eastern climates, it cannot be termed clean. Or did they know anything about the diseases which the system sometimes suffers through eating the flesh? Many of the birds of the vulture tribe we can at once pronounce as unfit for human food. There is one animal, however, which most English people delight in, yet was counted by them unclean, that is the hare. Why it should be so no one gives a reason; but it is a fact that hares, although clean living animals, are most subject and predisposed to tape-worm.

As to social hygiene, as far as cleanliness of body, of garments, and houses was concerned, many might yet draw a valuable lesson. If they came in contact, accidentally or otherwise, with any form of pollution or defilement, it meant a thorough cleansing. Strict law also existed to keep unpolluted any wells of water or streams from which they received their supplies.

Why was it that cleanliness was so essential? The reason which appeals to us is the same feeling which prompted the great artists in building the temples to the god and goddesses in Greek mythology, in which the sculpture work was perfect; let it be ever so high and out of the sight of men, prompted the Israelites to cleanliness. The former believed that their deities could see and look into every little detail; while the latter believed that God walked abroad in their camp, and that no uncleanliness should be seen by Him.

Just a word about our own Public Health Laws. There is, perhaps, no country in the world that can boast of such complete sanitary laws, and such equity shown in the discharge of the same.

In this our Government have done well. What we want now is really to educate the masses of the people up to this hopeful sanitary Utopia. There are three great mediums which must work to accomplish this. The School, the Pulpit or platform, and the Press.

I consider it one of the duties of our Government to cause instruction on the laws of hygiene, &c., to be given to the children in elementary Government Schools. That the clergy should see that there is nothing more conducive to raise the social and moral tone of a community than pure air, pure water, and thorough cleanliness, I am pleased to state that the Church is realising this fact, and good work has and is being done by the existing Church Society, and thirdly, by the mighty influence of the Press, they may be brought to some practical issue. It is no use lecturing to a man that he requires so much air space for the proper maintenance of a healthy body, while the circumstances in which he is placed compel him, his wife and family, to huddle together in one small room. Neither could we tell that man of the necessity of keeping his own body clean, if we don't provide ample provision for allowing him to do so.

Thanks to the sanitary legislation of these last ten or twenty years, which embraces the causes of deterioration and disease of the human system; that is to say, the material causes, such as impure air, impure water, insufficient and unwholesome food, dampness in soil and houses, deficiency of warmth, &c. The removal of the above causes is the principal aim of all practical hygiene as enforced by our legislative enactments.

There is yet another means I should like to mention, which has been instrumental in strengthening the hands of the Government in these matters. That is institutes and associations, such as the Sanitary Institute, the Institute of Sanitary Engineers, the City and Guilds, the Worshipful Company of Plumbers, and the Church Institute,

through meetings held, publications printed, and technical education given, the way continues to be made easier for our Government to extend its legislative powers.

An interesting discussion followed, in which Messrs. DOVE, STOVOLD, WELLS, MAYNER, RAYNER, LOWE, and PALMER took part. In conclusion a hearty vote of thanks was voted to Mr. McAdam for his very able paper.

General News.

HOME.

NOTICE.—On and after 31st March next the Annual Subscription to this Journal will be raised to 12s. 6d. to all NEW Subcribers. NO ADVANCE will be made to our friends whose names are entered on our Subcription list prior to that date, so long as they continue to Subscribe.

CUMNOCK.—A site has been approved for the erection of a district hospital.

WALSALL.—The Town Council propose to erect an isolation hospital, principally for small-pox cases.

GODMANCHESTER. — The Medical Officer of Health reports that the death-rate for the past year is 16·2 per 1000.

RHYL.—A town's meeting has been held at which a resolution was adopted calling upon the Council to take steps to put into force the Housing of the Working Classes Act.

ANCOATS. — In connection with the Ancoats Healthy Homes Society on Thursday week, Dr. Worswick gave an instructive lecture on the "Human Body," illustrated with limelight lantern views. This society is doing a splendid work in encouraging the study of hygiene by the people.

HENLEY.—By direction of the Rural District Council four samples of water have recently been analysed; two of these were taken from Charney and two from Farringdon. The report of the analyst condemned the two latter as unfit for drinking, and also deemed those from Charney as unsatisfactory. The report has caused considerable anxiety in the district.

MERTHYR.—At the last meeting of the Urban District Council it was reported the Council in committee had adhered to the opinion that the Sanitary Inspector had not exceeded his duty in regard to the reporting of infectious diseases. He had only inspected the surroundings of the reported cases, and did not, as had been asserted by medical men of the district, attempt to diagnose any of the cases referred to. The report was adopted.

SHIELDHALL. — Considerable extensions have now been completed to the Govan Combination Hospital, and the new portion was formally opened last week by Provost Kirkwood. The cost of the additions is estimated at £12,550, of which £11,500 were for buildings and £850 for furnishing. This brings the total expenditure on the hospital up to £37,800, or an average of £378 per bed. One improvement made is the discharge of the sewage from the hospital in a sewer running direct to the outfall instead of an "open burn" along the east side of the original site.

SOUTHILL.—There is a bad outbreak of measles in this parish. The schools have continued closed, and many adults are victims of the epidemic.

PRESTWICH.—The complaints recently made as to the impurity of the water supply are stated by the Medical Officer to be without foundation.

COVENTRY.—The City Council, advised by Mr. Hawkesley, has decided to oppose the Bill being promoted by the North Warwickshire Water Company to supply the parishes of Foleshill, Exhall, Sowe, Wyken, Stoke, Binley, Keresley, &c, with water, on the ground that it involved danger to the Corporation's water undertaking.

NORWICH.—At the last meeting of the Corporation, Mr. C. E. Muriel moved the adoption of the recommendation of the Sanitary Committee as under:—"That the isolation hospital be altered and enlarged, and wards for scarlet fever, typhoid fever, diphtheria, and discharging patients, and a porter's lodge with residence over for the Medical Officer be added thereto, and additions be made to the laundry, kitchen, and heating apparatus, at a cost estimated by the City Engineer at £7000." After some discussion the debate was adjourned.

MIDSOMER NORTON.—The report of the Medical Officer of Health (Dr. Whicher) for the year 1897 showed the health of the district to be excellent, with a continued low rate of mortality. There was also a marked diminution in the number of notified cases of zymotic diseases—13, as against 33 in 1896. The estimated population in June last was 5550. Births registered: Boys, 89; girls, 96; total, 185; or a birth-rate of 33·33 per 1000. Sixty-five deaths were registered, being one more than last year, and at the rate of 11·71 per 1000. The infant mortality was 64·81 per 1000.

NORWICH.—Two years ago the Corporation arranged for slop-water closets to be fixed in a portion of its district. Complete satisfaction is expressed with them. In a report recently presented the city engineer states that notwithstanding a stringent watch no waste of water has been observed in consequence of its construction, and at no time has it been a nuisance in any way. In every respect the slop-water closet is a very great advance on the pan closet it replaced; it is as much superior to the bin closet; and in many respects for outdoor closets is preferable to water-closets. The slop-water closet requires absolutely no supply of water whatever beyond the ordinary waste of the household; it is not subject to being put out of action by frost; the concentrated flushes tend to keep the house drains in good working condition as compared with middens, bins, or other such abominations; offensive matter is not retained in the neighbourhood of houses for more than an hour or two, instead of for days, weeks, or months; the cost of removal is nothing, it being done automatically by the flow of waste water; the addition to the flow of sewage is very trifling; the difference in the cost of pumping, treatment, &c., is inappreciable; and the nuisance arising from the old system of collection is entirely obviated. The water supply of the city is economised as compared with that required for water-closets, in that, as for slop-water closets, there is absolutely no water required beyond the ordinary waste of the house.

RAMSEY.—Borings are being made in order to discover a source for a pure water supply.

BROMYARD.—Consent to a loan of £550 for purchase of a steam roller has been received by the Rural District Council.

BERWICK.—The Works Committee has under consideration the advisability of erecting lavatories for ladies in the town.

WHITECHAPEL.—Tenders are to be invited for the supply of twelve new water vans for use in the district at the estimated cost of £45 each.

TRURO.—Mr. J. Retallack, Sanitary Inspector, reports a marked improvement in the sanitary condition of the district. In 1897 he served 424 notices to abate nuisances and provide water supplies.

BIRMINGHAM.—A Local Government Board inquiry has been held into the application of the City Council for sanction to borrow £10,000 for lunatic asylum purposes, and also to borrow £12,510 for the erection of a refuse destructor at the Montgomery-street Wharf.

LONGTON.—A special meeting of the Sanitary Committee of the Town Council was held recently to consider the present state of things in regard to the diphtheria epidemic. The committee, as the result of their deliberations, decided that all the schools should be again closed for a period of a month.

BIRMINGHAM. — The Association of Birmingham Students of the Institution of Civil Engineers held its fourth ordinary meeting of the session on the 20th inst., at the Midland Institute. Mr. W. Bayley Marshall presided over a good attendance. Mr. A. Burton read a paper descriptive of the Hanley sewage works. The paper was subsequently discussed at length by the students.

MERIDEN. — The Rural District Council has appointed a committee to confer with Mr. Willmott, County Surveyor for Warwickshire, as to the best means of obtaining a pure supply of water for the Marston Green district, Dr. Bostock Hill and Messrs. Southall, Birmingham, having reported that six samples of water submitted to them for analysis were little less than clarified, and contained partially oxidised sewage.

GLASGOW.—Mr. Gale, the Engineer, reports that the quantity of water sent into the city and district during 1897 averaged as follows:—From the Loch Katrine works, 46,196,731 gallons per day; from the Gorbals works, 4,782,797 gallons per day, total, 50,979,528 gallons. Compared with the previous year, the average daily total shows an increase of 1,822,485 gallons. At the River Supply works the quantity of water pumped for supply to manufacturers averaged 2,572,841 gallons per day, an increase over the previous year of 27,455 gallons daily. Regarding the new works, Mr. Gale states that the driving of the tunnel through Loch Katrine Hill continues to progress at the rate, on an average, of forty lineal yards per month at each face. The length driven during the past year has been 976 lineal yards, which leaves 643 yards still to do, and at the rate of forty yards at each face the whole will be completed by the end of August, after which there will remain the concreting inside, and the basins at the inlet from the Loch, to complete the contract. The other new works are also progressing.

NORTHWICH. — A Local Government Board inquiry has been held into an application of the Rural District Council for sanction to borrow £520 for works of water supply for the townships of Cuddington, Hartford, and Weaverham.

TOTTENHAM.—A Local Government Board inquiry has been held at Coombe's Croft into the application of the District Council for sanction to borrow £1500 for extension and enlargement of water mains in Philip-lane and West Green-road. There was no opposition.

MAIDSTONE. — The Local Government Board inquiry on the recent typhoid epidemic will be opened on Monday next, the 31st inst., at the Town Hall. At the last meeting of the Town Council a resolution was carried asking the Local Government Board to postpone the inquiry until Dr. Thomson's report had been presented, but the Board intimated to the Corporation that they did not consider sufficient grounds had been shown for postponing the investigation.

NEWTON ABBOT. — For the fourth quarter of 1897, Dr. Harvey reports a death-rate of 10·4 per 1000, against 14·6 in the corresponding period of 1896. Commenting on these figures, Dr. Harvey says, that although the death-rate was a highly satisfactory figure the age distribution of the mortality was very bad, as no less than ten out of twenty-five deaths were in infants under one year, and two between one and five years; eight were, however, in persons over sixty-five years.

MANCHESTER.—The Corporation Committee has reported on the suggested purchase of the Royal Infirmary and site. It is recommended that the Corporation pay, and the Trustees of the Infirmary accept, the sum of £286,000 for the Infirmary land, and the various rights and arrangements which were the subject of consultation. This purchase-money is equal to a price of £25 per square yard if the esplanade be excluded from the computation. If the esplanade be included in the calculation, the price for the land to be absolutely vested in the Corporation for ever is equal to £18 10s. per square yard.

ABROAD.

GERMANY.—According to the Berlin correspondent of the *Standard* the *Reichszanzeiger* publishes a long and rather unfavourable report on the foot-and-mouth disease in Germany. It has never quite died out since July, 1887, and has since then attacked all parts of the empire. Investigations have shown that the micro-organisms which have been regarded by a good many *savants* as the cause of the disease, especially Siegel's bacillus and Kurth's streptococcus, have nothing to do with it, and that the true origin has not yet been found, probably because the ordinary bacteriological method is unequal to the task.

CANTERBURY, NEW ZEALAND.—Following the course adopted last year the side channels in the streets of the city, in which there are no sewers, and in which houses have consequently to be drained into the street channels, are again being regularly cleansed with disinfecting fluid, and will be during the summer months. One or two amusing incidents are recorded in this connection. Some persons have mistaken the fluid, which turns white in water, for soapsuds, and have laid complaints accordingly. The fluid is carried by the sweepers

in large flasks, and it is said that an individual who noticed one of the men putting one of these receptacles into his coat pocket, reported him for surreptitious drinking in working hours.

Personal.

MR. A. PURKISS has been appointed Inspector of Nuisances for the borough of Andover.

MR. R. LORD has been appointed Inspector of Nuisances for the Borough of Loughborough.

MR. W. A. PEAKE has been appointed Inspector of Nuisances for the rural district of Gnosall.

MR. J. W. WEBSTER has been appointed Inspector of Nuisances for the urban district of Cowes.

MR. G. HOPE has been appointed Medical Officer for the seventh district of Brentford Union.

MR. J. WORRALL has been appointed Inspector of Nuisances for the urban district of Long Eaton.

MR. M. M. HARLEY has been appointed Medical Officer of Health for the urban district of Newport Pagnell.

MR. H. P. TOPSFIELD has been appointed Vaccination Officer for the Rayleigh district of Rochford.

MR. A. E. NORMINGTON has been appointed Medical Officer of the Stoke-upon-Trent Workhouse.

MR. E. T. WHITAKER has been appointed Medical Officer of Health for the rural district of Blymhill.

MR. T. F. WOODHEAD has been appointed Medical Officer of the Meltham district of Huddersfield.

DR. DARBY has been appointed Medical Officer of Health to the Lye and Wollescote Urban District Council.

DR. ROBERT BROWNE has been elected Medical Officer at Rathmines in succession to the late Dr. Montgomery Ward.

DR. JOHN BRADFORD has been appointed Medical Officer for the Parish of Carluke, in room of the late Dr. Robert Stewart.

MR. F. G. SKINNER, of Wakefield, has been appointed Surveyor and Inspector of Nuisances for the rural district of Norman Cross.

DR. R. B. BARR has been appointed Certifying Surgeon for the civil parish of Carluke under the Factory and Workshops Act.

AT the last meeting of the Police Commission of Forfar, Mr. T. M. Inglis, V.S., was appointed Veterinary Surgeon under the Public Health Act of 1897.

MR. E. A. SANDFORD FAWCETT, C.E., F.G.S., of 1, Victoria-street, S.W., has been appointed a temporary Engineering Inspector at the Local Government Board, and Messrs. John Taylor, Sons, and Santo Crimp, C.E., of 27, Great George-street, S.W., have taken over his practice.

Sewerage Schemes.

[TO MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

THE sewage works for Pleasley (Notts) are now completed.

THE County Council of Dumbarton has sanctioned the borrowing of £4000 for the Duntocher drainage scheme.

A DEPUTATION from Manchester Corporation visited Glasgow recently to inspect the Dalmarnock sewerage works.

THE Plaistow Highways Committee is considering a plan for the surface-water drainage works at Plaistow-lane.

AN application to the Local Government Board to borrow £12,000 for a sewage disposal scheme for Armagh has been made by the Armagh Town Commissioners.

A SCHEME for dealing with the Doveridge sewage by precipitation and filtration through artificial filters will be discussed at the next meeting of the Sudbury Rural District Council.

AT a meeting of the St. Austell District Council a letter was read from the Local Government Board suggesting that the Council should employ a competent sanitary engineer to prepare a scheme for the disposal of the sewage of Tywardseath.

A LOCAL Government Board inquiry has been held at Evesham into the application of the Rural District Council to borrow £2000 for sewerage works at Badsey. The Parish Council of the latter place opposed chiefly on the question of cost.

AT a special meeting of the Rhymney Urban District Council an agreement for the acquisition of a site of four acres for the sewage disposal works at the Mardy at a cost of £1750, subject to the approval of the Local Government Board, was sealed.

ANOTHER step towards the realisation of the Glasgow sewage scheme will shortly be taken, as in the ensuing session of Parliament the Corporation will apply for powers which, if granted, will ensure that the whole of the sewage of the city and burghs on the south side of the river will be conveyed to the purification works at Braehead by a double system of sewers. The quantity of sewage which will then be dealt with will, it is estimated, be about twenty-four million gallons daily.

THE Hungerford Rural District Council at its last meeting unanimously passed the scheme of drainage and sewage disposal submitted by E. W. Ives, C.E., of Derby, and it was resolved to at once apply to the Local Government Board for sanction to borrow £4000 to carry out the scheme.

A LOCAL Government Board inquiry was held at Kibworth on the 20th inst. in reference to an application of the Market Harborough District Council for sanction to borrow £3550 for the purposes of sewerage and sewage disposal for the parishes of Kibworth Beauchamp and Kibworth Harcourt.

ON Thursday afternoon, the 20th inst., Colonel C. H. Luard, R.E., one of the Local Government Board Inspectors, attended at the Guildhall, Poole, for the purpose of inquiring into an application made by the Poole Town Council for sanction to borrow the sum of £622 for carrying out works of street improvements and sewerage.

AT a recent meeting of the Isle of Wight Rural District Council the Council considered the General Purpose Committee's report as to the sewerage scheme for Freshwater. The committee recommended that the principle of the scheme prepared by Mr. George Chatterton be adopted, and this was done. It was stated that the scheme, which involved a high-level and two low-level sewers, the latter to be pumped up into the higher level sewer, would probably cost £20,000, only £1000 of which would be spent in sewering Totland.

AT a special meeting of the Morecambe District Council on Friday, the 20th inst., the twelve competitive schemes for the sewerage of the district were again considered, and eventually the scheme submitted by "Forward" was adopted. The scheme will serve for a population of 60,000, and the estimated cost of the works is £39,227 10s. 9d. (exclusive of way leaves, engineering, or land). The successful competitor is Mr. H. B. Nichol, C.E., 60, Corporation-street, Birmingham. The cost of the schemes submitted varied from £19,000 to £66,000 (not including working expenses). The scheme will now be submitted to the Local Government Board for approval.

THE Llanishen sewerage scheme, which has extended over twelve months, is now complete, and consists of about six miles of stoneware pipe sewers, varying in size from 9in. to 18in. internal diameter, having an outfall into the Ystradyfodwg and Pontypridd main sewer at a point near Fairoak Farm. The sewers are constructed on the duplicate or separate system, that is, the subsoil and surface water is excluded from the sewers, and the pipes are of sufficient size, and laid to a gradient to carry off a known quantity of sewage, with slight variation, all the year round, and calculated to be of sufficient size to meet the requirements of the district for forty years to come. The road gratings of the man-holes and lamp-holes are made air-tight, and cast iron ventilators are being erected, fitted with an apparatus for the consumption or burning of the sewer gas before being discharged into the air. Automatic flushing tanks, each containing not less than 1000 gallons at each discharge, are provided at suitable places. The sewers are laid in straight lines from man-hole to man-hole or man-hole to lamp-hole, which are constructed at each change of gradient or direction, thus enabling any obstacle or stoppage to be detected and removed without opening out any part of the sewers. The pipes used were those manufactured by Messrs. Noel, of Llantrisant, with the exception of some cast iron and Sykes' patent jointed pipes where large springs were met with. Wm. Evans was Clerk of Works; Messrs. Batchelor and Snowdon, engineers and contractors, Cardiff, were the contractors; and Mr. Wm. Fraser, A.M.I.C.E., &c., the Surveyor to the Llandaff and Dinas Powis Rural District Council, was the engineer.

Lighting.

A COMPANY is being promoted at Worle for the purpose of erecting gasworks.

PLANS for new works at Friarton have been approved by the Gasworks Committee of Perth.

IN view of the success of the incandescent lighting in the main thoroughfares of Greenock, it has been decided to apply the system in Shaw-street and Dalrymple-street, between Rue-end-street and Nicolson-street.

IN consequence of the numerous complaints as to the quality of the gas supplied to Norwich, the Town Council has given its committee power to incur any necessary expense to have the gas more frequently tested.

A CORRESPONDENT of the *City Press* states that in consequence of the high price charged for electric current in the City of London (8d. per Board of Trade unit), some of the consumers have reverted to the use of gas.

AN extension of the electric plant of the Southport Corporation has just been completed. The present capacity of the works is more than five times as great as it was when the installation was laid down just over three years ago. Even with this addition, it is expected that the capacity of the installation will be overtaken next winter.

NOTWITHSTANDING the fact that few rural towns in Scotland are ahead of Alloa in the matter of gas lighting, the local Commissioners have favourably considered a scheme for the introduction of electric light. They anticipate that the installation will cost a trifle under £3000, and that the total charges will not be more than £435 per annum, which is only £134 more than they are at present paying for gas light.

THE Tottenham and Edmonton Gas Light and Coke Company, at a meeting on February 5th, will consider their Bill now before Parliament, entitled "A Bill to make further provisions as to the capital of the Tottenham and Edmonton Gas Light and Coke Company, and to empower them to supply electricity, and for other purposes," which will be submitted for the approval of the proprietors.

THE report of the Electric Lighting Committee of the Chester Town Council shows that after providing for interest on capital, and the amount required to be laid by for the sinking fund, a profit remained of £561. Of this sum £421 was returned to consumers in the shape of an extra discount, and £141 was carried forward to next account. The Town Council have given notice to take over the electric lighting works in March next.

A REPORT has been issued to the members of Glasgow Town Council on the question of the electric lighting of the Springburn tramway route, upon which the experiment in electric tramway traction is to take place. The Electrical Department report that the necessary mains required to be laid down will cost £12,566, which includes provision for private lighting purposes. The cost of electric energy for the whole of the proposed 104 lamps is estimated at £1872.

AT the last meeting of the Sub-Gas Committee (Meters and Mains) of the Leeds Corporation it was decided to reduce to seven the list of applicants for the post of Superintendent of Gas Meters and Mains, the salary for which is £250 a year. The seven from whom the final choice will be made are :—Messrs. James Halton, Halifax; Arthur Grafton, Tunbridge Wells; Ernest Johnson, Nottingham; R. H. Garlick, Salford; George Ball, Birmingham; O. J. Preston, Brentford; and Walter Hole, Rochester.

THE movement to introduce electric lighting and traction in Kirkcaldy is making satisfactory progress. Professor Alex. B. W. Kennedy, LL.D., F.R.S., M. Inst. C.E., of London, has met the Tramways and Town Council Committees with a view to reporting on the proposed combined scheme of electric lighting and traction. Professor Kennedy recommended the combined scheme, which had no engineering difficulties, and was being carried out in other towns, and he approved of the overhead electric system of traction.

"IN consequence," says the *Gas World*, "of the saving on incandescent gas lighting in Berlin public lighting, all the public lamps are to be adapted to this system. Out of £5000 granted for the extension of incandescent lighting in 1897, £4500 has been spent on about 4300 lamps. A further sum of £3125 is to be spent on 3479 lamps, without delay. Of the 22,006 public lamps, 11,483 are already worked on the Welsbach system, and the saving between April 1st, 1896, and October 1st, 1897, is stated to have been 154,000,000 cubic feet. When the transformation is complete, it is computed that the consumption will be 350,000,000 cubic feet per annum instead of 595,000,000."

MR. W. GIBBS presided at a special meeting of the Redditch Urban District Council, held on Thursday evening, to receive from Mr. McMullen, electrical engineer, the plans and specifications in connection with the electric lighting scheme for the town. From the canvass of the town, it was evident that 2000 16 c.p. lamps, or their equivalent, would be connected to the mains. Such a number of lamps would consume about 60,000 units, bringing in an income of £1500 at 6d. per unit. The cost of running the station for that purpose would be £650. The total yearly expense, including this sum, would be £1290, showing a profit of £210. Street lighting was a matter for experiment on the spot after they had got the mains in the streets. Mr. McMullen was instructed to advertise for tenders for the work.

Law Cases.

DEFECTIVE DRAINS.

MR. HOWARD MORRIS, C.C., solicitor, of Walbrook, appeared to an adjourned summons taken out at the instance of the Islington Vestry for not complying with an order made by Mr. Bros directing him to put the drainage of a house he owns in Wyatt-road, Highbury, into a condition satisfactory to the Vestry.

Mr. BRAMALL appeared for the Vestry; Mr. BODKIN, barrister, was for the defendant.

Mr. BODKIN raised the preliminary point that the order was bad. Sub-Section 5 of Section 5 of the Public Health Act provided that, if the person on whom the order was made so required, the works to be done should be specified in the order. He would show that Mr. Cobban, who appeared for the defendant when the order was made, asked that the works to be done should be specified, but a month afterwards, when the order was served, it was found that no works had been specified. By that time the right to appeal had been lost.

Mr. BRAMALL said that he should be able to show that no requisition, as contemplated by the Act, was made.

James Henry Stanlake, clerk to the defendant, said that he was present in court when the verbal order was made. Mr. Cobban asked what works were to be done. He wanted them specified. The magistrate then said he would make the order for the work to be done to the satisfaction of the Vestry.

Mr. BROS: That is the order I meant to make. I meant it to apply to the whole drain.

Mr. BODKIN: We contend, Sir, that you did not say enough. Having been requested to specify the work to be done, you should have done so. All the notice said was "Drain defective," and that defect was remedied before the order was made.

Mr. BRAMALL said that the Vestry had opened the ground, and it had been found that the drain would not stand the water test.

Mr. BODKIN said that was because the workmen broke the pipe in the examination.

Mr. BROS said that he intended the order to apply to the whole drain.

Mr. BODKIN protested that his client could not be expected to expose the whole of the drain to look for defects. The Act of Parliament gave the

Vestry ample power to find out what defects existed, and then they could specify them and compel the owner to do the work. But if they opened up the drain and found no defect then the Vestry had to bear the expense. Mr. Morris was contesting the matter upon public grounds. The Vestry distributed their notices broadcast, then came into Court, where they obtained verbal orders, which they afterwards drew up in their own way. Really their proceedings were most unfair.

Mr. BRAMALL said the strictures which had been passed on the Vestry proceedings were without a tittle of foundation.

Mr. BROS said that if the defendant was not prepared to have the order quashed by another tribunal he must obey it.

Ultimately, after a long discussion, Mr. BROS said that it seemed to him that the only question for him to consider was the amount of penalty to be imposed for disobedience.

The case was further adjourned in order that the magistrate might read the correspondence.

Notes and Queries.

[Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C 1

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

948.—ACCUMULATION OF MANURE: PROCEDURE TO OBTAIN REMOVAL. — "Terry" writes: — "In this district a cab proprietor deposits manure from a stable, where four or five horses are kept, in a yard which is complained of by the tenant of an adjacent cottage as being a serious nuisance. The manure heap is adjacent to the wall which separates the yard from the street. (1) Will you please advise as to how often the manure should be cleared away? (2) Does the sanitary law define the distance at which such a manure heap must be constructed from a dwelling-house, if so, please state distance and section of the Act. I enclose plan of locality."

Answer.—(1) Presuming that this is an urban district the following sections will apply to the case, viz.:—(*a*) Sec. 49 of the Public Health Act, 1875, where the Inspector of Nuisances may on its appearing to him that any accumulation of manure, dung, soil, or filth, or other offensive or noxious matter, ought to be removed, he shall give notice to the person to whom the same belongs to remove the same, and if not so removed within twenty-four hours, it shall be vested in the Urban Authority and removed and sold by them, &c. (*b*) Sec. 50: Notice may be given by the Urban Authority, by public announcement or otherwise, for the periodical removal of manure or other refuse matter from mews, stables, or other premises, and where any such notice has been given any person to whom the manure, &c., belongs who fails to remove the same, or permits a further accumulation, and does not continue such periodical removal at such intervals as the Urban Authority direct, shall be liable without further notice to a penalty not exceeding 20s. for each day during which such manure is permitted to accumulate. (*c*) Secs. 91 to 96: The accumulation of manure may be a nuisance as defined by Sec. 91, and proceedings may be taken under the sections following. (*d*) Bye-laws with respect to nuisances. If bye-laws on this subject are in force in the district, it will probably be found that a clause exists similar to Clause 12 in the Model Series of Bye-laws which regulates the construction of premises for cattle, horses, swine, &c., and which prescribes the removal of dung weekly or some other period. (2) Neither the Public Health Acts nor Bye-laws prescribe the distance at which manure heaps may be constructed from dwellings. Our correspondent should communicate with the Sanitary Authority or their Inspector, who should be able and willing, we think, to assist him in obtaining the abatement of the nuisance.

949.—MARKETS AND FAIRS CLAUSES ACT, 1847: RECOVERY OF TOLLS. — "Surveyor" writes: — "I have been appointed Collector of Market Tolls to this Urban District Council. It has long been the custom to sublet the tolls, but this year, there being no bids for them, their collection was placed in my hands. Our lease with the lord of the manor contains the words, 'To collect tolls, fees, and charges for any sale or attempted sale in the market square, streets or other places in the lordship.' We lose a considerable amount owing to farmers and others, who bring large quantities of fowls to the town, putting up their conveyances at the inns, and calling in at the fowl dealers from the market square, who buy the fowls and bring them into the market. If we demand the toll from the dealer, he refuses to pay, saying that he has bought, not sold, while, if we apply to the farmer, he refuses on the ground that he did not sell in the streets, but in the public house, the consequence being that we get a lot of fowls on the market square, three-fourths of which have evaded the tolls. The dealer pays for the few he brought to the market, and so claims

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a standing. Will you kindly advise me what course to pursue? Also what is the best step to take when a man selling goods on the market refuses to pay his toll?"

Answer.—The district is that of an Urban District Council. Assuming that the Council have been empowered, as required by Sec. 166 of the Public Health Act, 1875, to purchase the private rights in the market, and to take stallages, rents, and tolls in respect of the use by any person of such market, and that the tolls leviable, as provided by Sec. 167 of the Act, have been approved by the Local Government Board, the Urban Authority are entitled to recover tolls, after the market place is opened for public use, from every person other than a licensed hawker who shall sell or expose for sale in any place within the prescribed limits, except in his own dwelling-place or shop, any articles in respect of which tolls are by the special Act, *i.e.*, the Public Health Act, 1875, authorised to be taken in the market, and any person selling any article in contravention of this section, shall for every such offence be liable to a penalty not exceeding forty shillings (Sec. 13, Markets and Fairs Clauses, Act, 1847). If tolls are leviable on fowls, as we have no doubt such will be the case, the Urban Authority, through their duly appointed collector, may recover the tolls from the vendors of the fowls, if such be sold after the market place is opened, and within the district of the Local Authority, notwithstanding that such may have been sold at inns or places other than the market square. If any person liable to the payment of toll refuse to pay the same on demand from the person appointed to collect the same, the collector may recover the tollage by distress, as in the ordinary case of rent, or he may recover the same by action in a court of summary jurisdiction. The collector should, through the local Superintendent or Inspector of Police, obtain the assistance of a police constable, in probable cases of dispute or refusal to pay tollage, for corroborative evidence in case of summary proceedings being necessary, or where it may be necessary to levy a distraint on any animals or articles brought to the market.

950.—Bye-laws as to New Streets: Surface Water Sewers and Drains.—"J. W." writes:—"The District Council of R—— have put down sewage works on the precipitation and filtration principle of the International Company's process, the precipitant used being Ferozone. Until recently storm-water from streets, houses, and backyards, passed into the sewers. Owing to the cost of Ferozone, the Council have passed a resolution that unless the plans for new houses show separate drains for conveying away surface water from roofs and backyards, such plans will not be approved. The Council have not yet put in storm-water sewers to receive surface water, and there is no bye-law in regard to storm-water drains. (1) Can the Council simply by a resolution refuse to pass plans of a new street unless both storm-water and sewage sewers are shown to be provided by the persons making new streets? (2) Can the Council refuse to pass plans which are in accordance with their bye-laws, but which do not show duplicate drains? (3) The Council not having provided storm-water sewers in their streets, can they require owners to put in duplicate drains in backyards, and begin a separate system of drains until they provide storm-water sewers themselves to receive the said storm-water?"

Answer.—(1) Unless the Bye-laws of the Local Authority contain provisions as to the sewering of the streets, we are of opinion that they will be unable to disapprove plans otherwise in conformity with the bye-laws, because sewers are not shown. See our answer to Query No. 905 in our issue of December 24th last. (2) We do not think so, but we should have been furnished with a copy of their drainage regulations, in order that we might definitely advise. (3) If the Council have not provided storm-water sewers into which the drainage of private premises may be conveyed, we are of opinion that they will be unable to enforce the construction of duplicate drains to dwelling-houses.

Vacancies.

Assistant Engineer (Bath, January 29th).—For the Bath Union Workhouse. Salary, £25 a year, with board, lodging, and washing. Mr. J. Mannings, clerk, 3, North-parade, Bath.

Assistant Inspector of Nuisances (Eccles, January 31st).—For the Corporation. Salary, £65 per annum, rising by annual increments of £5 to £100. Mr. George William Bailey, town clerk, Town Hall, Eccles.

Buildings Inspector (Southend-on-Sea (February 2nd).—For the Corporation. Salary, £104 per annum. Mr. William Gregson, town clerk, Southend.

Clerk of Works (London, N., February 5th).—For the Edmonton School Board. Salary, £3 3s. per week. Mr. John Moule, clerk, School Board Offices, Upper Edmonton.

Clerk of Works (London, N.).—Salary, £3 per week. Mr. E. J. Lovegrove, engineer and surveyor, Hornsey District Council, Highgate.

Clerk of Works (Teignmouth, February 9th).—For the Urban District Council. Mr. C. Jones, surveyor and engineer to the Council, Town Hall, Teignmouth.

Electrical Engineer (Barrow-in-Furness, February 8th).—For the Corporation. Commencing salary £200 per annum. Chairman of the Electric Lighting Committee, Town Hall, Barrow-in-Furness.

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INSPECTOR OF NUISANCES (WELLINGBOROUGH, February 2nd). — For the Urban District Council. Salary £80 per annum. Mr. J. T. Parker, clerk, 29, Church-street, Wellingborough.

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BARROW-IN-FURNESS.—January 31st.—Sewering.—Mr. John Butler, architect, Cornwallis-street, Barrow.

GULLANE (SCOTLAND).—January 31st to February 5th.—Sewer.—Messrs. Belfrage and Carfrae, C.E., 1, Erskine-place, Edinburgh.

LONDON, W.—January 31st.—Electric Lighting.—Mr. A. Saxon Snell, F.R.I B.A., 22, Southampton-buildings, Chancery-lane, W.C.

TONG (YORKS).—January 31st.—Sewers.—Mr. James Smith, Oddy-street, Tong-street, Dudley Hill.

LONDON, N.W.—February 3rd.—Sewer.—The Surveyor, Vestry Hall, Hampstead.

DENTON (LANCS).—February 5th.—Sewerage Works.—Messrs. Lomax and Lomax, 11, Fold-street, Bolton.

HOUGHTON-LE-SPRING.—February 5th.—Removal of Refuse.—Mr. John Geo. Baty, clerk, District Council Offices, Houghton-le-Spring

LONDON, S.W.—February 9th.—Reconstruction of Drainage, &c.—Mr. T. W. Aldwincle, 1, Victoria-street, Westminster.

TIPPERARY.—February 14th.—Sanitary Works.—Mr. Joseph Gubbins, clerk, Workhouse, Tipperary.

BURNLEY. — February 16th. — Mr. S. Edmondson, district surveyor, 18, Nicholas-street, Burnley.

HORNCASTLE.—February 1st.—Precipitating Tank.—Mr. S. G. Overton, 2, Manor House-street, Horncastle.

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THE

Sanitary Record,

FEBRUARY 4, 1898.

Notes.

THERE continues to be great and increasing attention paid to the discoveries made, and established in actual practice, within the past two years, that the purification of sewage, whether by land treatment or artificial filters, is dependent upon bacterial or, as it is also termed, biological action, and that it is only in a very minor degree chemical and mechanical. The systems which have been almost simultaneously developed at (1) Sutton, Surrey, of purifying sewage by passing it in its crude state through bacteria tanks constructed of coarse ballast, where the sludge is absorbed by bacterial action without cost in chemicals and sludge pressing; and (2) at Exeter on the septic tank system, where the crude sewage is passed through hermetically-sealed sewage tanks, and the sludge is absorbed by bacteria in a manner akin to the Sutton process, except that in the latter case the purification is effected by aërobic bacteria, while at Exeter it is effected by anaërobic bacteria, apparently attract the notice of Local Authorities who are desirous of a solution of the sewage disposal difficulty to an extraordinary degree.

WHILE we believe it is admitted that each system is successful in carrying out what is claimed for it, there is one point which does not appear to us to have had the attention which it deserves, viz., what is the relative cost of construction of works for the treatment of sewage for a given population, say 1000, on (1) the septic tank system as at Exeter, and (2) the bacteria tank system as at Sutton? From what we have been able to gather, the latter system requires no expensive engineering work, but that the filters may be and are constructed without artificial walls, and that it may be adopted anywhere and without payment of royalties, while under the Exeter system the cost of construction of tanks must be somewhat heavy, and being a patented process royalties will be payable to the patentees. It would be highly interesting if those concerned would furnish figures so as to enable Local Authorities to form an opinion as to the relative advantages and costs on a common basis of the systems in question, and we hope that this will be forthcoming.

A CRITIC of that part of Lord Rosebery's speech, to which we referred in our "Notes" last week, dealing with the larger views that are now taken by Municipal Authorities compared with those held a generation or two since, has justly pointed out that in making such a comparison we must be careful not to depreciate the importance of the work which has been done by our predecessors, or to overlook the fact that it would have been impossible for them, circumstanced as they were, to undertake enterprises of the nature that we are now facing, and for which we take such credit to ourselves. In the middle of the present century, and since the hands of our municipal fathers were quite full with important undertakings to introduce a sanitary *régime* into city life, modern sanitation had but just taken its rise, the new ideas took time to spread, and the task of our civic rulers then was to carry out these newly-recognised principles within the limits of their jurisdiction.

IT was a large task, and it cannot yet be said to be accomplished, for the perversity of human nature is a perennial factor to be reckoned with; and there is little hope of the day when dirt, and its concomitant disease, shall have ceased to exist. But much has undoubtedly been done, and for this our gratitude is due to the energy and the practical wisdom of our Local Authorities for the past

generation. Large improvement schemes, important drainage systems, extensive undertakings for water supply, together with the establishment of Health Departments in all our larger towns—these furnished work sufficient to engross the energies of the most energetic reformers. While so occupied it would have been impossible for them to think of such social reforms as picture galleries or museums for the people. "The sanitation of the mind as well as of the body" is an excellent precept, but the sanitation of the body comes first; and it was necessary that our cities should be cleansed physically before the higher claims could be attended to. We have reached a higher degree of development in that we are now able to attend to such claims; but it would be a mistake for us to forget that, had it not been for the work of those who have gone before us, we could never have reached our present stage.

The Duke of Devonshire received a deputation last week, introduced by Sir Henry Roscoe, with regard to the reorganisation of the University of London upon the lines of the report of the Cowper Commission. The deputation was composed of members of the Senate of the University of London, and representatives of teaching and scientific bodies, including many names of the highest eminence in their respective spheres. The unanimous opinion expressed was that the University should be remodelled on teaching lines, and that what has hitherto been merely an examining body should be reconstituted into a teaching university. The Duke of Devonshire, who evidently was in hearty sympathy with the objects of the deputations, assured them that the aid they had given him would be of great service in enabling him to urge on his colleagues and on Parliament the importance which was attached to the question by almost all those who were in any way connected with the teaching institutions of the metropolis. He thought that the delay which had thrown back the Bill of last year had had the advantage of removing most of the serious opposition, and a fair and just compromise between every shade of university opinion had been arrived at. There is, therefore, every prospect that this important measure will find a place in the coming session of Parliament.

It was announced a short time since that a generous but anonymous donor had been so moved by witnessing the spectacle in the present out-patients' department of the London Hospital that he had given the magnificent sum of £25,000, to be devoted to the building of a new department outside the hospital. Two conditions have been attached to the gift. One is that the out-patients should pay some small sum towards the cost, not of treatment, but of the medicine and bandages supplied; and the other is that hospital letters should be abolished for the future. Both of these reforms have commended themselves to many thoughtful observers. As for the first, it will diminish the pauperising tendency that generally results from the knowledge that the necessities of life can be had for nothing, and will add to the feeling of independence that should characterise the working classes. And at the same time additional care should be taken that our hospital system is not abused, as there is reason to fear that it sometimes is, by those who can afford to pay for medical attendance. Such cases are perhaps exceptional, but there is no doubt that they do occur occasionally; so that all doubtful applications should be carefully tested before gratuitous assistance is given. For it is not right that beds which have been provided for the poor should be occupied by those who are in fairly easy circumstances.

The other matter is perhaps of still greater importance. There is a growing feeling that the use of subscribers' lines is at variance with the principle which underlies all our hospital system. A hospital is supposed to be a charity, where people who are poor may have gratuitous medical attendance when sick. It is therefore felt to be an anomaly that a patient who is fortunate enough to possess an influential friend who is a subscriber should have a preference over those who are poor and ill, and without any such influence. And apart from this anomaly, it is unfortunately the case that subscribers' lines are a frequent source of friction between the subscribers and the management, for many people hold that if they pay so much a year, they are entitled to a *quid pro quo*—which, it is needless to observe, is inconsistent with the very idea of charity. In support of the present practice it is argued that, were it not for subscribers' lines, the subscriptions would show a serious falling off. Experience, however, shows that this is not necessarily the case, and many eminent authorities are now inclining to the view that it would be well that the system should be discontinued.

The distribution of the money received for 1897 for the Prince of Wales' Hospital Fund will at once be attended with beneficial results. The sums received from the sale of stamps, amounting to about £38 000, will be divided among such institutions as come under the classification of hospitals. The excellence of the idea of the hospital stamps has been proved by the handsome sum that has been received from this source. Then the annual subscriptions which have been promised, and the interest on investments, amounting to £22,050, will be divided among those hospitals where more than 100 beds are in constant occupation. By this means the most pressing wants of the larger hospitals are relieved for the present, and it is expected that in future the income of the fund will be sufficient to meet their requirements. The immediate result is that wards at Guy's, St. Thomas's, and other hospitals, which have been closed for want of funds, will at once be re-opened.

The statistics given by Sir Alexander Binnie, chief engineer to the London County Council, in his evidence before the Royal Commission on London Water Supply, which appeared in our "Notes" last week, are so bristling with large figures that to the mind unaccustomed to grasp the significance of numbers they are apt to be a little confusing. It is therefore satisfactory to know the practical deductions which a man of such experience has arrived at. Sir Alexander strongly advocates the placing of the London water supply in the control of the London County Council, less on the score of greater cheapness to the consumer than on the ground of public policy.

This conclusion is partly based on the experience of those large towns where the supply is managed by the Corporation. In Paris, for example, the daily consumption is 47·1 gallons per head of the population; in Glasgow it is 54·56 gallons per head; and in Buffalo, in the United States, it reaches the phenomenal figure of 325 gallons. The average daily consumption in London, on the other hand, is only 35 gallons per head, and that is most certainly not because the water is less needed.

The extraordinary outbreak of illness which has attacked many of the guests who attended the Warwick County Lunatic Asylum Ball at Hatton a fortnight ago, is at present surrounded with a good deal of mystery. At first it was given out by the Asylum Authorities that it was merely a violent outbreak of influenza, and it was officially reported that about forty persons, nurses and inmates in the institution, besides a number of attendants residing outside, were suffering from this malady. In addition to those connected with the asylum, however, a large number of those who were present at the ball have since been prostrated. They have been examined by their ordinary medical attendants, and their symptoms, it is said, point to some form of poisoning. The symptoms are reported to be nearly identical in all the cases, and include sickness, diarrhœa, and pains in the abdomen, and the conviction of the sufferers themselves is that they are suffering from poisoning and not from influenza. This belief receives support from the fact that the outbreak is confined exclusively to those who were present at the ball.

There is something strange in this conflict of medical opinion in a matter which one would have thought comparatively free from doubt. It is hard to understand how there should be any doubt as to whether the cases are cases of poisoning or not, though it may well be difficult to trace the outbreak to its origin. Notwithstanding the secrecy which is being observed by the authorities at the Asylum, the general opinion is that the cause must lie either in some fault in the food or in the cooking utensils, for it would appear that the influenza theory obtains no acceptance. In any case it is a matter which calls for strict inquiry. Mr. Wilmhurst, the Coroner for the district, is understood to have instructed special inquiries to be made by the police; an inquest will be held into the cause of the death of Mrs. Jones, the head nurse at the Asylum; the County Council are expected to take some action in the matter; and it is stated that the Home-office is taking steps to secure a careful investigation into the circumstances of the mysterious outbreak.

The anti-vaccinators who make their recalcitrancy a matter of principle have at least the courage of their opinions. Two gentlemen of a certain country town having been offered the alternatives of fine or imprisonment, have heroically accepted both punishments to seal their faith. They have paid, that is, the amounts of the fines and expenses to the treasurer of the local Anti-vaccination League, and at the same time they have, with much pomp and dignity, gone to prison, amid a chorus of congratulations from their sympathisers. But a better story still is chronicled of a certain clergyman who went to prison with two comrades the other day as a testimony to his convictions; and on the return of the martyrs from durance vile, they were honoured by their friends at a social gathering. The reverend gentleman, who was gifted with a humorous view of the situation, seems to have enjoyed his sojourn thoroughly. Never was he better treated in his life. The food was perfect, and his health apparently derived considerable benefit from the short confinement. And when we add that he was supplied with the writings of Mr. Andrew Lang and Professor Drummond, we can understand that the time was not unprofitably spent.

There are certain persons who take a delight in throwing out innuendoes on the conduct of public affairs by both local and national officials. In every village you will find some who are prepared to assert that the members of the Parish Council are "making a good thing" out of their serving upon so august a body. In larger districts others roundly proclaim that the affairs of the Urban or Town Councils are in a chaotic state, and that the finances especially are so muddled by the officers and committees that it is impossible to know whether the district is in a condition of solvency or hopeless bankruptcy. And, not content with these rash proclamations, they go on to denounce the officials as being susceptible to every form of corruption. As a rule these "knowing ones" usually confine their statements to generalities, and are careful to avoid specific charges. And should one of the accused meet them and challenge them to substantiate what they have affirmed, it is easy to discover they are entirely ignorant of the very matters of which they claim so complete a knowledge. Still their conduct often makes the lives of public men very uncomfortable, and arouses an atmospere of suspicion where there should be perfect trust and confidence.

But sometimes these charges against the honesty of public officers find their way into the press, and are made in such a manner as to cast a slur upon the integrity of large bodies of hard-working and conscientious men and women. Such an instance is before us as we write. Every week about a page of *Science Siftings* is devoted to "Queries and Answers." Some readers are supposed to propound questions, while others in their turn supply the answers. In the last issue one of the queries is "Why is London unhealthy?" Before dealing with the reply, we may say at once that the interrogation implies a state of our great metropolis which cannot be sustained. Broadly speaking, London is not unhealthy, as is demonstrated week by week in the returns of the Registrar-General. Compared with the other large towns, our capital city has no reason to be ashamed of its position in that list. That some neighbourhoods are little better than "death-traps" we readily admit, but to assert the "whole" is "unhealthy" displays a lack of knowledge altogether inexcusable. And the untenable prejudgment of the question contaminates the individual who professes to supply the answer.

He claims an acquaintance with the slums; he has dived into their worst recesses, and because in these he has discovered some "filth diseases," he proclaims, with all the pomposity of superior wisdom, that the metropolis is as bad as the queriest paints it.

If he had stopped here, no great harm would have been done, because after all he graciously informs the readers that this is "his private belief." Happily the country is free, and he may indulge in "private beliefs" to his heart's content. But when he goes on to level charges of dishonesty against the Sanitary Inspectors of the London County Council, the bounds of privacy are overstepped. He asserts that "the best-founded complaints as to the condition of an ill-drained tenement house may be rendered quite ineffective by 'tips' to the 'Inspector' of from 10s. to £1 per complaint. Poor and comparatively ignorant folks are helpless under such conditions of affairs. They realise the evil of insanitation; but they recognise the uselessness of invoking a corrupt maladministration of supposed sanitary law." For anyone to indite so base an insinuation against a respectable body of public servants is, to say the least of it, cowardly and despicable. No wonder the editor of the paper desires to dissociate himself from the "private belief" of his valued correspondent; but we venture to think that before he allowed such a sweeping accusation to appear in his pages he should have demanded some proof of their truthfulness. If this is not forthcoming, then he should decline to be a party to their propagation.

This "self-satisfied slummer" may have traversed some of the dark corners of the metropolis, but we question if he has the slightest knowledge of the rules and practices governing local administrative bodies and their officers; and we venture to assert there is no more conscientious worker among public health officials than the Sanitary Inspector. His duties are often unpleasant, and, added to this, he knows that in the minds of some there is an unreasonable prejudice against him; but this does not make him shrink from the performance of his duty. And to imply that he is prepared to sell his character, his prospects of advancement, and to risk his situation for a few paltry pieces of silver, is a wicked libel. That occasionally there may be found a "black sheep" is possible, but the whole body should not be condemned because one member is false to his trust. We challenge this anonymous assailant to produce evidence to substantiate his case; and until this is done we protest against such statements being circulated, even in a limited circle.

Our readers will remember that, some few weeks ago, considerable stir was occasioned by the statements appearing in a daily contemporary concerning the condition of the river Brent. The Urban District Council of Hanwell does not appear to have inquired very closely into the cause of the pollution, but forwarded a complaint to the Middlesex County Council, implying that the blame rested with it. Naturally the Council at once appointed a Special Committee to investigate the matter, and at the quarterly meeting held last week, this Committee presented its report. It was stated that samples of the water were taken, and a special examination was made, with the result that the pollution was traced to the sewage farm of the persons complaining, namely, the Hanwell Urban District Council, and they had instructed the solicitor to serve the Council with notice to abate the nuisance. The Urban Council must be sorry now that it did not make a fuller examination before fixing the blame elsewhere.

A significant report on aniline dyes in food has just been made to the Marylebone Vestry by Dr. Wynter Blyth, in which he emphasises the necessity for a reform in the laws governing our food supply. Dr. Blyth warns the members of the vestry that "the aniline dyes possess such great tinctorial power that even with those that are poisonous, the quantity taken in the consumption of any one ordinary coloured article is most minute, so that in few cases could decided symptoms be produced. On the other hand, when sugar, butter, milk, cream, sausages, confectionery, and a number of other things all have a small trace of analine, these traces in the day total up. Observation and experiment have shown that the aniline dyes in small doses interfere with digestion." Dr. Blyth states that it is his opinion that the increase of maladies of the digestive organs which has been noted of late is, in part, due to the increasing use of aniline or tar colours, and to the use of antiseptics such as boracic acid, formalin, and salicylic acid in foods. In conclusion he urges the necessity of its being made an offence to use aniline dyes for colouring foods unless the purchaser is informed of the fact. This recommendation, we are assured, will be endorsed by all analysts.

On another page we give some interesting details concerning a visit paid to Leyton for the purpose of inspecting the new refuse destructor. As Mr. W. H. Maxwell, Assistant Surveyor, Leyton, will shortly give an illustrated description of the destructor in question in the course of his very able articles dealing with destructors in general, now appearing in our columns, we have not gone into the matter in connection with this particular function—a most gratifying one to all concerned, by the way, and an occasion which showed the public spirit of Leyton at its best.

TO OUR READERS.

The Editor solicits the co-operation of readers in making The Sanitary Record *more attractive by means of pen-and-ink sketches, photographs, and diagrams. There are many phases of sanitary work which lend themselves admirably to illustration. By this means not only individual articles, but the journal as a whole will be heightened.*

THE SANITATION OF DOMESTIC BUILDINGS.

By Frank Latham, C.E., M. San. Inst, &c., Assistant Surveyor, Borough of Margate.

CHAPTER II. (*continued*).

Section 3.

The question of soil pipes is as important a part, if not more so, as any portion appertaining to the house drainage system, both as regards material and workmanship. It is a great mistake on the score of economy to use cheap soil pipes. These are cheap, perhaps, to the builder, but dear, to say the least of it, to the owners and occupiers, especially when they involve sickness and consequential trouble and expense.

The best material for soil pipes is drawn lead, weighing not less than 8 lb. to the superficial foot.

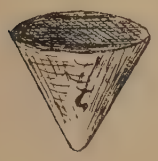


Fig. 15.

Cast and seamed lead pipes should not be used for any drain purposes, they being subject to pinholes and other weaknesses, and therefore not to be depended on, besides which they will not stand bending.

The advantages of drawn lead pipes are that they are smoother and less absorbent than other pipes, conducing to cleanliness and the reduction of fouling to a minimum, they are also more reliable and durable, being less affected by the weather. They are less cumbersome, and can be bent into any position required.

The wiped joint is the strongest and best for all lead pipes. It is no easy matter to make a satisfactory joint of this description; on the contrary, it requires a large amount of skill and experience on the part of the plumber before he succeeds in mastering this difficult part of his craft, and it naturally follows that such work, if required good, must be well paid for. In the first place there must be a socket and spigot for one pipe to fit into the other, as in the case of drain pipes, but in this instance such sockets have to be formed by the plumber at the end of the pipe, instead of these being ready made by the manufacturer. This part of the work is of all importance in order that no part of the pipe or joint should be weakened, and that no solder can gain access through the joint into the interior of the pipe.

Fig. 16.

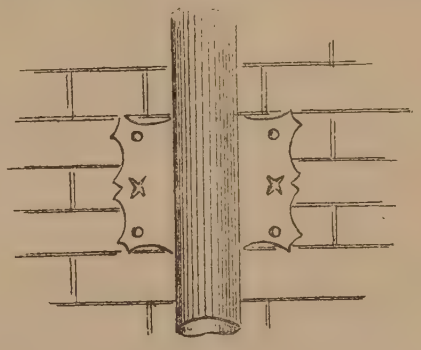
Fig. 17.

The best way to obviate such defects is to form the socket by opening the end of the one with a wooden tan pin (Fig. 15) to a sufficient width to receive the spigot end of the other pipe, which should also be treated slightly in a similar manner, with the outer edge rasped off till very thin in order to make it take its bearing and become a true fit with the interior of the socket. This being done, any grease that may exist should be removed, and the ends painted a few inches up the external and internal surfaces, with a mixture of vegetable black or lamp black, glue, and dried chalk or whiting, and upon its becoming dry the external surfaces of both socket and spigot for an inch or two, according to the size of the pipe, together with a small portion round the inside of the former, should be shaved with a shaving-hook (Fig. 16), removing the paint and a very thin portion of lead, leaving them perfectly bright; to prevent tarnish, tallow should be rubbed over these bright parts. After the pipes have been properly adjusted, the solder, which is attended to by the plumber's mate, whose duty it is to see that it does not become overheated, consisting of one part of tin to three parts of lead, is now applied, being poured round the shaved portions of the pipes. The joint is then wiped into shape by means of a thick soldering cloth, which consists, as a rule, of moleskin well greased on the surface with tallow (Fig. 17).

Fig.

Plumbers wipe as many of their joints as possible in the workshop, but there are cases where upright joints have to be made. In these cases, to prevent waste of the surplus solder while making the joint, which would otherwise fall to the ground, a lead collar, well soiled, should be fastened round the soiled part of the pipe just below the joint (Fig. 18). This will catch the solder, which upon cooling can be easily removed.

Next to the wiped joint, but a long way from being near it as regards perfection, stands the blown joint and the copper bit joint, neither of which, in



Fig

these days of high sanitation, should be used. Good plumbers, as a matter of fact, will not adopt them for sanitary purposes. They consist, in the first instance, of the lower end of the top pipe being thrust into the upper end of the lower in a similar manner to that of the wiped joint, only to a greater depth. This being done in the case of the blown joint, the part where the joint is required to be made is heated by means of a flame blown against it by a blow-pipe, and a stick of solder is heated by the flame and run all round the joint till the socket is filled. The copper bit joint, which is inferior to the former, is made by a stick of solder

being melted into the space between the spigot and socket by means of a heated soldering iron, which has a copper end or bit. The solder for these joints consists of more tin than that used for wiped joints.

It is a mistake to use soil pipes of too large a diameter, as they only afford additional surface to become foul, and are not so self-cleansing by the action of the flush as smaller ones, and, further, they are more cumbersome and costly. As a rule, 3 or 3½in. lead soil pipes are sufficient for general purposes.

All soil pipes should be fixed outside the house

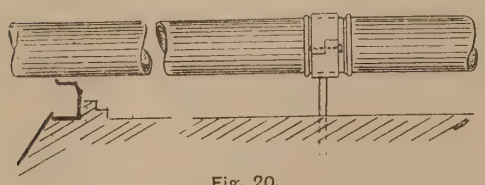


Fig. 20.

wall in the external air, as it must be remembered that the house drains, to a great extent, ventilate through the soil pipe; and should it be defective through age or accident the foul air would, in most cases, simply pass out into the open atmosphere, but if fixed inside such air would be introduced into the dwelling, thus setting up a dangerous nuisance.

The proper manner to fix lead pipes is by lead tacks, which are plates of lead, about 8in. long and

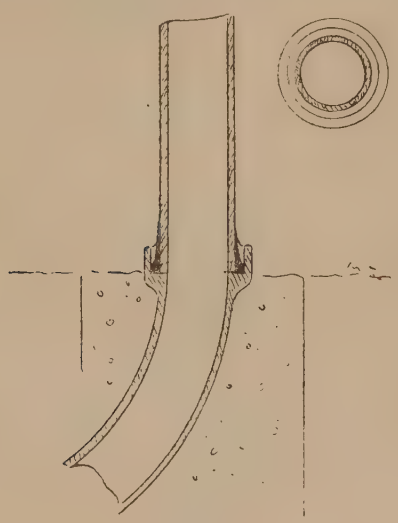


Fig. 21.

4in. wide, soldered on to the back of the pipe. These plates should be made of good stout lead, not less than 8 lb. to the superficial foot, which is very necessary when the weight of the pipe to be fixed is reckoned. These tacks should be put on the pipes in pairs, one pair for every six feet, and fastened to the wall by two large-headed galvanized iron wall-nails to each tack. (Fig. 19.)

The best position for soil pipes is facing south, where they will not be so much affected by frost and cold, which eventually affects the wear of the lead; and, further, a warm pipe increases the ventilating velocity. They should also be sheltered as much as possible in the nook between the walls of the house and back addition, but at the same time should have as few angles and curves in their course as possible, as not only do angles impede the flush, but also the ventilation, and cause extra wear and tear.

The connection between the lead soil pipe and the drain should not be by merely thrusting the foot into the stoneware or iron bend as far as it will go and then filling in the joint with cement, but the lead pipe should be slightly opened, bell-shape at the end so as to fit the socket of the bend, and then the joint properly cemented and made tight; or, what is better, a circular brass collar can be soldered round the end of the pipe, and extend three or four inches up the sides, being slightly thicker at the base, which will allow a firmer joint to be made in cement or lead. (Fig. 20.)

Iron soil pipes are much used, they being cheaper than lead, and if the work is well done are almost as successful. The too common practice amongst plumbers of using ordinary rain-water pipes jointed with red lead or putty is to be condemned, as not only are the joints insufficient, but the pipes being not intended for such purposes are much too flimsy to stand a proper test, or to be safely caulked.

When iron pipes are used they should be heavy soil pipes in 6ft. or 9ft. lengths, and not less than $\frac{5}{16}$in. in thickness, with good deep sockets, not less than 4in., and fixed against the wall with proper iron collars fastened round the sockets and secured by means of arm pieces into brickwork. (Fig. 21.) The spigots should be provided with a bead all round to fit easily into the socket, and after a few strands of gasket have been carefully forced between spigot and socket, the latter being upwards, the remaining depth of the joint should be made with melted lead and then finished with a caulking tool, at the same time taking care not to overdo it and split the pipes. All iron soil pipes should be coated inside with some special process to prevent corrosion and to preserve the metal, such as with Dr. Angus Smith's solution, or painted with Blundell's petrifying liquid, or three coats of oxide, or glass-lined.

Galvanised iron pipes are much used for this purpose, but they also require special inside treatment, as it is found that the surfaces undergo rapid deterioration under the action of sewage. Galvanising consists of covering the iron with a thin coating of zinc by placing the heated pipes in a bath of chloride of zinc and afterwards into melted zinc and cooling off.

NOTE.—The Fig. marked A in issue of 21st inst. should have been part of Fig. D, and the Fig. marked Fitzpatrick's Joint should have been marked A.

Sanitary Congress and Health Exhibition, Birmingham.—The Sanitary Institute has accepted an invitation from the Council of the City of Birmingham to hold its next Congress and Exhibition of Sanitary Appliances, Articles and Manufactures connected with health in that city, commencing September 19th, 1898. Full particulars as to space, &c., in the Exhibition will be ready shortly, and can be obtained on application to Mr. E. White Wallis, secretary of the Institute.

NOTES ON
PRACTICAL SANITARY SCIENCE.

By WILLIAM H. MAXWELL.

Assistant Engineer and Surveyor, Leyton Urban District Council, Author of "Drainage Work and Sanitary Fittings," "Ventilation, Heating, and Lighting," &c., Certificates of the Association of Municipal and County Engineers, and Sanitary Institute.

No. 47.—REFUSE DESTRUCTORS.

(Continued from page 89.)

At Oldham a series of experiments carried out by Mr. Watson showed that the average temperature of the mattress chamber through which the hot gases pass on their way to the boiler was found to be 2019 deg. Fah., the minimum being 1654 deg. Fah., and the maximum 2346 deg. Fah. The above results are confirmed by the melting of three pieces of cast iron, of which the melting point was not less than 2100 deg. Fah., in one of the fires.

For taking the temperatures, the following apparatus on the principle of the "*method of mixtures*"[121] was used. An ordinary iron bucket was cased all over with about 2in. of slag wool or silicate cotton, the cover for the top being movable. A thermometer was hung over the side of the bucket, dipping into about two gallons of water, less or more, weighed for each experiment. Pieces of wrought iron from 4½ lb. to 5½ lb. weight were used, and it was found that the loss of weight by oxidation was negligible even for several successive experiments with the same piece. The loss of heat by radiation from the bucket was also negligible, being at 120 deg. Fah., only 1 deg. in 15 minutes; whereas the maximum temperature of the water, after the hot iron was put into it, was reached in less than five minutes. The method of using the instrument, as is well known, is to place a piece of metal (iron in this case, whose specific heat was taken at 1255) of known weight and specific gravity in the gases whose temperature is to be measured, and, when it has had time to reach the same temperature as the gases, to withdraw it and quickly place it in water of a known weight. The amount by which the temperature rises is a measure of the temperature of the iron before being placed in it.

The temperature of the gases as they escaped from the boiler flues was also measured, and found to be something over 855 deg. Fah.

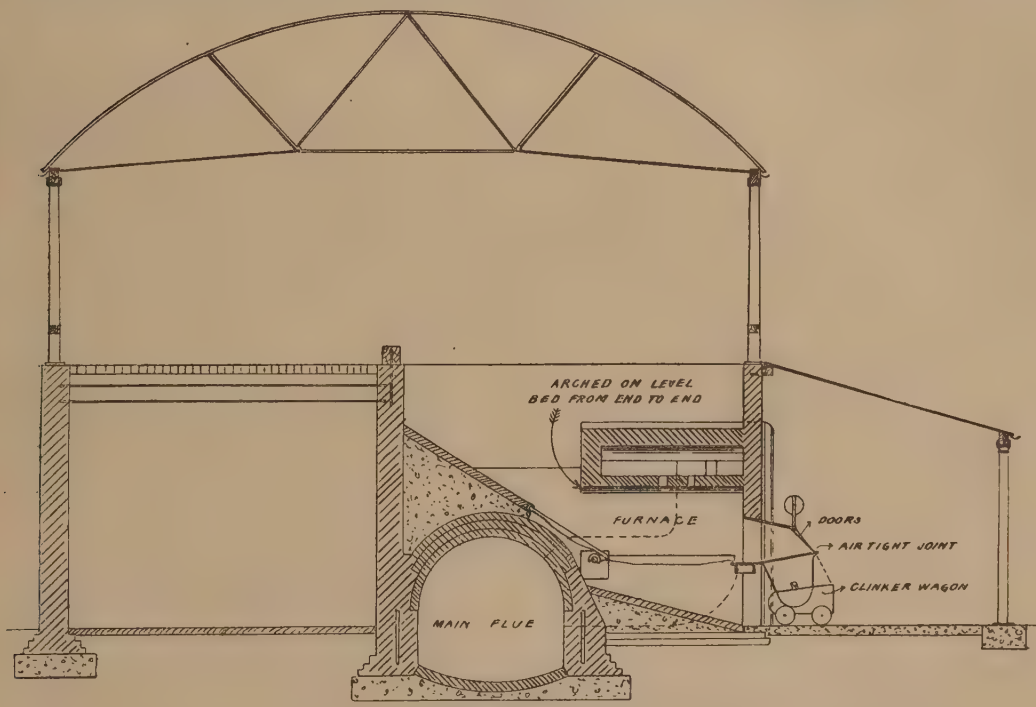


Fig. 11.—Section of one form of Healey's Destructor.

At Oldham steam is generated by the surplus heat in a Lancashire boiler, and 15-indicated horse-power is said to be obtained from each cell. The power thus generated is utilised in working two mortar mills, to supply power to the horses and provender department and a portion of the electric lighting station, and to produce the forced draught through the furnaces. Each furnace, it is stated, consumes over 8 tons per 24 hours as an average as shown by actual weighing, and as much as 8 tons 16 cwt.[122] per cell per 24 hours has been consumed. The residuum (including clinker and fine ash) of the bulk dealt with is given at 33 per cent. There is no demand for the clinker and ashes as such, but there is said to be a "ready sale for the mortar produced from the clinkers at 5s. per ton; also, successful experiments have

[121] *Vide* paper by Professor W. C. Roberts-Austen, C.B., F.R.S. "Proceedings" Inst. Civil Engineers, vol. cx., page 152.

[122] *Vide The Surveyor*, April 2nd, 1897.

been made in converting the clinker into paving blocks."[123]

Mr. C. Estcourt, F.C.S., F.I.C., Public Analyst to the City of Manchester, having analysed samples of clinker and gases resulting from the burning of ashbin refuse, garbage, &c., taken by him during the ordinary course of working at the Oldham destructor, reported[124] the results as extremely satisfactory, showing what a powerful effect the steam draught has upon the combustion. He states that "the carbonic acid without steam on is only 2 per cent., while with steam half on it is 9 per cent., and with steam full on it is 14·5 per cent., proving that the steam draught has the effect of getting full value out of the air that is used. The clinker is so burned that practically there is nothing combustible left therein; it may be tipped in a heap when hot from the furnace without fear of further combustion taking place. Further, no nuisance could arise from a heap of such clinker, either hot or cold. The analyses of the gases taken from the destructor furnace and the flues show that the combustion is practically perfect. No malodorous vapours can possibly escape. This is largely attributable to the action of the steam jet forced-draught apparatus, combined with the other arrangements of the furnace which ensure that only the proper quantity of air is admitted to the furnace. The steam, in passing through the incandescent fuel on the grate, is decomposed in such a manner as to assist in the formation of water-gas. The gases passing from the chimney are remarkably free from dust. The waste gases could not possibly cause a nuisance, or any injury to vegetation in the neighbourhood of the destructor, and in my (Mr. Estcourt's) opinion there is no necessity for a chimney more than 50ft. high to carry them off. The gases are completely cremated, the furnace being designed on thoroughly scientific principles."

The analysis of gases taken from the furnaces burning with full steam on is as follows:—

	Per cent.
Carbonic and sulphurous acids	14 6
Oxygen	5·4
Nitrogen	80 0
	100 0

The Horsfall Refuse Furnace Company also have a smaller type of this destructor, styled the "*Hospital Destructor*," which is stated to be capable of destroying about two or three tons of the most offensive material in a 12-hour working day. The furnace is used for rendering innocuous infected bedding, clothing, excreta, or any other offensive or dangerous material as garbage and refuse. A destructor of this kind has been supplied to the Joint Hospital Committee of the Blaby and Wigston Isolation Hospital.

Healey's Destructor.

A distinguishing feature in connection with this furnace,[125] one form of which is shown in Fig. 11, is the arrangement of flues whereby the gases from one furnace have to pass over the bright fire of another in a more forward state of combustion before escaping. The furnaces are worked in pairs, and the gases alternately made to pass from one to the other by means of dampers. The provision of a movable drying floor over the furnace is also made, upon which the charge is allowed to rest until it is thoroughly dried. The floor is then allowed to fall and drop it on to the grate.

The refuse is fed on to forward motion fire-bars, and in one form of this furnace the bars have also a slow wave-like motion imparted to them by means of a cam action worked by a special and simple steam or water motor, thus slowly moving the burning refuse towards the furnace doors, where it can be received into an iron trolley or barrow fixed to the furnace door, so that no fumes or heat can escape. Over the furnace is a reverberatory arch provided with openings communicating with a flue, which itself joins the main flue under the back of the furnace; the communicating flue being constructed in the thickness of the division walls separating the cells. A forced blast is also provided, if thought necessary, to increase the combustion.

A furnace called Fryer's and Healey's destructor was erected at Bradford, and in a paper read by Mr. C. Jones in 1887, at a meeting of Municipal Engineers at Leicester it is referred to in the following terms:—"The arches and furnaces were like Fryer's, and, following in the steps of previous inventors, he (Mr. Healey) attempted to purify the gases. The main arch was constructed hollow over the top and the gases made to pass at the back of each cell down the sides and over the arches, and the high temperature of the arches and flues were to have destroyed the offensive gases." The fumes and smoke of the Southfield-lane Destructor, Bradford, are now passed through a "Fume Cremator."

REFUSE DISPOSAL AT LEYTON.

AN INTERESTING FUNCTION.

At the invitation of the Leyton Urban Council about two hundred municipal engineers and surveyors, and chairmen of vestries and councils throughout London and the provinces, visited the borough on Thursday, 27th ult., to inspect the refuse destructor recently erected by Messrs. Beaman and Deas. Much interest was evidenced in the function, not the least interesting feature of which was the presence of that veteran sanitarian, Sir Douglas Galton, K.C.B., Chairman of the Committee and Past President of the Sanitary Institute.

The visitors subsequently sat down to a *recherché* lunch at the Town Hall, at which Mr. C. G. Musgrave, Chairman of the Council, presided.

Mr. J. Trumble, Chairman of the Sanitary Committee, proposed the health of their chief visitor, Sir Douglas Galton. He alluded to the difficulty experienced in Leyton in the disposal of the sewage until they adopted the present system. After twelve months' working he thought it was due to the inventors that they should tell their friends all over the country that they had solved the problem.

123 *Oldham Evening Chronicle*, May 14th, 1896.
124 March 27th, 1896.
125 Mr. Healey has obtained numerous patents for destructor furnaces and arrangements connected therewith. The following may be mentioned for reference:—No. 2369 (1880); No. 5203 (1882); No. 10,035 (1884); No. 7703 (1885); No. 9342 (1886); No. 177 (1888); No. 1005 (1892); No. 8249 (1892); No. 12 990 (1892); No. 18,398 (1892); Nos. 6688 and 13,105 (1893); No. 12,179 (1894); and No. 14,598 (1896).

Sir DOUGLAS GALTON, in reply, said that at every moment of their existence they were throwing off disused matter in some shape which, if left in the vicinity, immediately turned into some form of poison. It was this refuse which, when scavenging was unknown, and when narrow streets and overcrowded houses were the rule in English towns, caused the plague to desolate their population. It was from similar causes that the vast centres of population in India were now suffering from the plague. They removed their liquid refuse from large towns by underground rivers and streams. In London the network of these under their streets was as great a marvel as the houses and palaces above ground. Until recently they had turned their sewage into the sea, or classified it by mixture with some substance which caused the solid part to be deposited. The deposit had to be disposed of. It was not sufficiently rich as a manure to bear the cost of conveyance to any distance by farmers, and within recent years London had incurred a charge of £100,000 a year to get rid of it by putting it into barges, from which it was dropped into the sea. That seemed to him a wasteful process, although his friend, the late Professor Huxley, used to say that a great abundance of fish in and near the estuary of the Thames was due to London sewage. (Laughter.) Here at Leyton, with the assistance of Messrs. Beaman and Deas, they had done much better than London. (Applause.) They had obtained a destructor, which dealt in a marvellous way with the refuse sludge. For after removing it from the tanks they in Leyton had only to squeeze it thoroughly and throw it into the furnaces, and then the heat from the perfect combustion, assisted in working the necessary machinery, and the clarified effluent passed into the river. But the burning of refuse, although it was hygienic, was an absolute waste unless they could devise some method of making use of the heat. A destructor should possess three qualities; it should burn up perfectly the refuse put into it without preliminary treatment, it should admit no deleterious fumes or smells, and it should supply heat to perform some useful operation. (Applause). In the Beaman and Deas destructor, with ordinary refuse a minimum temperature of 2000 deg. Fah. was maintained in the common combustion chamber, and he was informed that a pair of cells could consume fifty tons of refuse per day. This large consumption was accomplished because of the use of forced draught. It was to the skilful application of forced blast in this destructor that it owed its consistent high temperature in the combustion chamber and the complete combustion of the refuse. There were other peculiarities about the destructor which afforded most interesting subjects of speculation to the engineer, but these details would lead him too far. He must offer his congratulations to the town of Leyton upon the excellence of their sanitary administration, under which they had obtained so efficient a method of dealing with their refuse. They burned the whole of the solid refuse which resulted either from their sewage, their slaughter-houses, their streets, or their houses. They produced from it an innocuous clinker, a material which helped in the formation of the roads and footpaths, and they generated a large amount of heat, part of which worked their machinery, but very much now went to waste. He trusted this now wasted heat would soon be applied to some useful purpose—either upon the German plan in obtaining pure fat and gelatine from the offal of the slaughter-houses, or assisting in the lighting of the town by electricity, and in the drawing of the tramcars. It had occurred to him whether, seeing they had made such admirable progress in the disposal of this class of refuse, they might not progress a little further in the direction of what he might call more advanced hygiene. He had noticed that in the vicinity of the destructor there was an isolation hospital. It was a most desirable thing that persons dying of an infectious disease should be cremated. He hoped he should not wound their susceptibilities by his suggestion, but might they not provide on a similar system for the hygienic disposal of the dead? They who were advanced sanitarians looked upon the day as not far distant when, with their increasing population, cremation would largely prevail over the country, and he hoped he did not shock them too much by suggesting that their installation here might be usefully supplemented by the most hygienic adjunct—a crematorium.

Mr. MUSGRAVE said, as they all knew, Leyton immediately adjoined the metropolis, and therefore they had to deal with their own sludge. In 1881 the census showed that the population of Leyton was 26,000; in 1891 it was 63,000; and to-day it was between 90,000 and 100,000. He proceeded to speak of the difficulty of dealing with the sewage of this increasing population, and said a Committee of the Council travelled and saw every destructor in operation in England. They saw those that professed to destroy refuse and sludge, but they saw none dealing as they now dealt with theirs, and it was safe to say there were none dealing with the refuse and sludge as they did. (Hear, hear.) As public men they knew the difficulty of making a Council adopt a principle for which there was no precedent. However, thanks to their Surveyor, they decided upon this, and he would just read a recent report of the Surveyor:—"Since the last meeting of the Committee, four weeks ago, we have consumed 794 tons 4 cwt. 1 qr. of house refuse, and 530 tons 3 cwt. 3 qr. of pressed sludge, making a total of 1324 tons 8 cwt. in four weeks, or 16½ tons per cell per twenty-four hours." The destructor had done more than Messrs. Beaman and Deas had guaranteed it to do. That being so, he was perfectly satisfied, and the Council were also perfectly satisfied. He asked them to drink to the continued success of the Leyton destructor, and to Messrs. Beaman and Deas, the inventors.

Colonel SHARRATT replied. On behalf of his co-directors and himself, he was very pleased to have the opportunity of thanking the members of the District Council, and in so doing he would like to mention the names of Mr. Trumble, the Chairman of the Sanitary Committee, and Mr. Dawson, the Surveyor, for their courteous manner and ready appreciation during the erection of the works and since the opening.

Mr. SHARRATT proposed "The Chairman and Members of the District Council," to which Mr. MUSGRAVE replied.

Mr. BARE proposed "The Health, Prosperity, and Success of the Engineers and Surveyors," to which Mr. LEWIS ANGELL, Mr. DAWSON, and Mr. JOHN ANGELL replied.

The CHAIRMAN proposed "The Visitors," for whom Major FLOWER, Lea Conservancy, and Professor ROBINSON replied.

THE SANITARY INSTITUTE.

(Model Answers to Questions set at the Examination in Practical Sanitary Science held at Bristol, July 2nd and 3rd, 1897.)

(Continued from page 720)

Question 5.—What are the chief causes of contamination of the subsoil of dwellings, and how can they be avoided?

Answer.—The subsoil of dwellings erected on disused refuse tips is fouled by organic matter of both animal and vegetable origin and by the gaseous products of the decomposition of such matter. The Model Bye-laws of the Local Government Board direct that no such site should be built on until all filth is removed by excavation or otherwise. The annotated edition gives three years as the period in which such sites will become harmless by natural agencies, but most sanitarians say that many years may elapse before such a site can be safely used, and many would object to its being built on at all.

In old cities the whole subsoil is discoloured and offensive from various sources of pollution, as leakage from sewers, drains, and cesspools, escapes of gas from the mains, &c. Such a subsoil cannot be cleansed, but evil results of gaseous emanations may be avoided by a layer of good Portland cement concrete with a covering of asphalt over the whole site, by proper damp courses both over footings of basement and cellar walls, and just above ground level, and by building all basement walls hollow or with a dry area. Subsoil around a dwelling, and—by the diffusion of gases—under the dwelling may be contaminated by leakage from drains, privies, cesspools, soakage from pigsties, farm middens, &c., near the house. Also by soakage from unpaved back yards, on which filth falls or is thrown and gets washed in by rain falling directly thereon, or from the roof. These evils may be prevented, in the case of new buildings, by the precautions already mentioned: by paving all surfaces likely to be fouled, by testing all new drains by hydraulic pressure, by keeping all places for storing of filth of all sorts at a distance from the house and constructing them water-tight.

Question 6.—Describe the properties and uses of the following materials:—Portland cement, lias lime, chalk lime, hair mortar, asphalt, sandstone, oolite, and granite.

Answer.—Portland cement—an artificial cement, manufactured from chalk and clay, intimately mixed, burnt to a clinker, and ground very fine, has the property of setting under water and in other positions deprived of free contact with atmospheric air—should be grey or greenish grey in colour, weight about 112 lb. to the bushel, and pass through a sieve with 2500 meshes to the inch. Used in sanitary work for concrete; under-footings, over site of house, for fireproof and other floors, &c. Also for jointing drain pipes, and in the construction of ashpits, cesspools, &c.

Chalk lime.—Chalk is a nearly pure carbonate of lime, the white chalk being the purer, produces a fat lime, slaking violently when watered. Its "setting" properties are very poor, it is therefore unfit for use in masonry where strength is required. It is used for ordinary plastering on the ground of economy, because it can be thoroughly slaked, and on account of its porosity a doubtful advantage.

Asphalt is a combination of bitumen with calcareous matter, natural or artificial. It is impervious to water, nearly impervious to air, fireproof, and has some elasticity. It is used for damp courses, floors, pavements, and many other purposes.

Oolite.—A class of free stones, composed almost wholly of carbonate of lime. The well-known Portland, Bath, Chilmark, and Caen stones are oolites. The characteristics of oolite vary largely in different quarries and in different beds in the same quarries. Some of the Portland stone will stand exposure to the weather, and is useful for ashlar masonry; other varieties are good only for inside work; some of the softer kinds are excellent for carving for internal work.

Lias lime consists of carbonate of lime with more or less clay and other ingredients. The stone is dark blue before burning, and of a grey colour afterwards. It slakes slowly. Possessing hydraulic properties in a greater or less degree, it makes good mortar for ordinary building work.

Hair mortar.—A mixture of fat lime mortar, with hair, used for first plaster coats of walls and ceilings. The hair is used to give it cohesion.

Sandstone consists of grains of quartz (or occasionally carbonate of lime) cemented together by silica, carbonate of lime, magnesia, alum, oxide of iron, &c. Colour varies greatly, the variation being due to various combinations of iron. Sandstones are classified as flagstones, tiles stones, free stones and grits, the three first being useful for the purposes their names denote—the latter obtainable in large blocks, and being very hard and strong is useful for engineering works. Granite, properly so-called, consists of crystals of quartz and felspar and scaly mica. It has great strength, is hard and durable, and is used principally for heavy engineering works, for road setts and road metal.

Question 7.—What powers have a Rural Sanitary Authority to make bye-laws, and in respect to what nuisances are these limited?

Answer.—A Rural Authority may make bye-laws for the following purposes:—

Scavenging.—The cleansing of footways, removal of house refuse, cleansing of sanitary conveniences.

Common lodging-houses.—Prevention of overcrowding, cleanliness, and ventilation; precautions against spread of infectious diseases, &c.

Houses let in lodgings.—Purposes similar to the last.

Hop pickers.—Securing decent lodgings and accommodation.

Fruit pickers.—Same purposes as last.

New buildings.—Treatment of foul sites, drainage ventilation, and air space, structure of sanitary conveniences, &c.

Water-closets.—Ensuring provision of water for flushing.

Prevention of improper alterations to buildings constructed under Building Bye-laws.

Temporary dwellings (tents, vans, sheds &c.).—For promoting cleanliness and habitable condition; for prevention of spread of infectious disease; For prevention of nuisances.

Mortuaries (with respect to management of.)—

The Local Government Board may confer upon Rural Councils the powers of Urban Councils for the purpose of making bye-laws in respect of the following matters.

Nuisances.—For the prevention of nuisances arising from snow, filth, dust, ashes and rubbish, and from the keeping of animals. Save that as regards the keeping of animals, a Rural Authority cannot prescribe distance of pigsties from dwellings.

Slaughter-houses.—In respect of prevention of cruelty, cleanliness, drainage, ventilation, removal of garbage, water supply, &c.

Offensive trades.—With reference to prevention of nuisance from effluvia where materials are treated by heat, prevention of nuisance from storage of materials, and from retention of waste matters on premises, drainage, cleanliness, periodical lime-washing, &c.

New streets.—With respect to level, width, and construction, and as to sewerage.

New streets.—Provision of secondary means of access for removal of house refuse.

Public sanitary conveniences.—Prevention of improper use of.

Paving of yards.—Compelling owners to pave insanitary yards.

Removal of filth along streets.—For restricting removal to certain hours.

Powers as to making "regulations" for various purposes and powers derived from County Council in respect of Bye-laws for Lodging-houses for the Labouring Classes appear to be beyond the scope of the question set.

Question 8.— Describe the proper construction and fitting of a valve water-closet, and a short hopper closet, detailing the manner in which the water should be supplied and the way in which the discharge pipes should be dealt with.

Answer.—The valve closet consists of a hemispherical glazed stoneware basin, with a hollow rim to flush all parts of surface of basin equally. An opening of 3in. diameter at bottom of basin with a short cylindrical neck allows escape of contents to soil pipe.

A valve of metal, moved by a pull or handle, working from outside basin, closes neck of basin to retain water, and opens to release it. The same pull causes flush from cistern above. A pipe called the overflow arm opens at upper end into basin in such position as to enable it to remain about two-thirds full of water.

This arm discharges into valve box and is bent to form a trap. It is an advantage if the overflow arm is open at top to allow access for cleaning; also that the flushing rim should be continued round to assist in cleansing the arm and to keep the trap always sealed.

The valve box of each pipe in which the valve works is between basin and a trap below, and is above floor.

A pipe opening at one end into valve box and at the other into outer air, affords ventilation, and prevents collection of foul gases that might escape into closet through valve opening when the basin is flushed.

A sheet lead safe (or shallow tray) is sometimes fixed on floor under closet to guard against possibility of drainage from overflowing of basin. A pipe conveys any water falling on the safe to the outer air. Passage of air inwards is prevented by a hinged flap.

The necessary amount of water to effectually flush a valve closet is not less than three gallons, and it is preferable that the flush be regulated by special mechanism known as a "supply valve and bellows regulator," rather than by the ordinary service box or waste preventer. The cistern to be supplied by ball valve, and to be at least 4ft. above pan, the discharge pipe 2in. diameter.

The trap beneath valve box (and under floor) should be preferably of lead, connected by a lead branch to a lead soil pipe with wiped joints, and properly ventilated to prevent syphonage.

Short hopper closets are of three kinds—the ordinary, shaped like a frustum of a cone; the "washout," which retains water in a depression in bottom of basin; and the "washdown." The latter only should be used; the others are not self-cleansing. The back of the "wash down" is nearly vertical, soil falling into water retained in throat of trap. A hollow "rim flush" effectually scours all parts of inner surface.

Service box is usually made to hold two gallons (three gallons would be better), and is emptied by a pipe not less than 1¼in. diameter, and 5ft. high from rim to cistern. On an upper floor lead trap and branch is best as for valve closet, but on the ground floor the stoneware trap in general use, connected direct with drain head, answers all necessary purposes.

NATIONAL HEALTH SOCIETY.

DR. A. T. SCHOFIELD has commenced a course of hygienic lectures to ladies in the Children's-room, Denning-road, Hampstead, under the auspices of this Society. At the first lecture there was a large attendance. The first part of the afternoon's lectures was devoted to explanatory matter concerning the skin covering of the body, illustrated by a diagram, and also dealt in facts and figures showing what is the true proportion of the bodily form. The lecturer showed that the true shape of the waist should be an oval and not a circle. He made a drawing on the blackboard of the shape of the foot, showing its beautiful arch, and said that too much standing alters this arch and causes its depression, whereas walking exercise is good and beneficial. After an interval, during which afternoon tea was served, the second lecture was given. It contained information of a practical character, such as methods of taking baths and thorough cleansing of the skin. Dr. Schofield said that before sponging the body with cold water it is safer to put the feet and legs in warm water, the effect of so doing being to withdraw the blood from the head and trunk, and so prevent all danger of congestion of brain or liver. He advised the use of salt water, and gave a practical hint as to how it might be made soft by adding to the ewer of water over night a little Maignen's Anti-Calcaire.

HASTINGS.—We are asked to state that samples of the water supplied to the Borough have just been submitted to the eminent analyst, Dr. Dupré, who reports that the waters are of great organic purity, and of the highest class.

THE MICROBE AS A PUBLIC BENEFACTOR.

In the course of a popular lecture on microbes at the London Institution, Mr. Bottomley reviewed for his hearers the history of the study of bacteriological science. It was in 1680 that Leuwenhoff first discovered by the aid of a simple form of microscope the microbes which exist on the teeth, but it was not until nearly 200 years later that the science was taken up in earnest—and we owe nearly all our present knowledge to the exertions primarily of Pasteur. The word microbe we owe to the Paris Academy of Sciences, who suggested it in 1878 as a ready compromise between the rival claims of the zoologists and the botanists for the possession of certain of the more minute growths; and Pasteur adopted and popularised the term. It now includes the fungoid growths—such, to take simple examples, as the fungus on jam, or the mould on boots, the "ferments," such as yeast, and the bacteria proper. A further sub-division of the micro-organisms divides them into those which look like billiard balls, these are the micro-cocci; those which look like lead pencils, these are the bacteria bacilli; and those which are spiral in form, the spirilla. But it is a mistake to regard all these micro-organisms as enemies of the human race. If it were not for microbes, where should we get the flavour in our tobacco from? Where the taste in our butter? Cheese of the Gorgonzola or the Gruyere or the old Stilton would be beyond our reach; and so would a "gamey" pheasant; and so indeed would be our best linen, which owes the process of "retting" to the action of a friendly microbe. But the best instance of the friendly microbe's services lies in that which is done by the phagocytes in our blood. These are micro-organisms belonging to the race, already mentioned, of billiard balls—the phagocytes exist as "diplo-cocci." Professor Mentschikoff, the Russian bacteriologist, has lately shown that inside the bodies—if such a term can be applied to micro-organisms so minute—of the phagocytes we may find the half-consumed bodies of unfriendly bacteria which the "phagocyte" has stalked and eaten. Another development of bacterial energy is witnessed in the case of the micro-organisms which appear upon the roots of plants. Everyone knows the old agricultural rule that you must not keep on "wheating" a piece of ground, but that wheat must succeed and be followed by a leguminous crop. The reason of this is that wheat wants more nitrogen than the leguminous plants for its growth; or, to express the same truth more accurately, the bacteria growing about its roots are of a different constitution from those of turnips or clover. Professor Hobbe, the German, has advanced this investigation a stage further. He has shown that certain plants, for their proper development and growth, must have certain microbes about their roots. He, therefore, makes cultivations of these mirobes in gelatine—and sells them at half-a-crown a test tube—so that the farmer can now water backward crops with a proper infusion of bacteria.

What the farmer more properly should do would be, however, to allow the requisite microbes to cultivate themselves among his seeds. The power of reproduction of these microbes is immense, and is due, of course, to the rapidity with which they bud and breed. A microbe, for instance, which doubles itself every half hour, as some of these can do, will have multiplied its numbers at the end of the day to 16,000,000. At the end of the second day, although you could easily get 250,000,000 of microbes on to a postage stamp, the microbes would so have multiplied that they would occupy a cubic pint, and at the end of the third day would weigh 8000 tons. Fortunately the struggle for existence among themselves, and the diseases which they develope forbid any such multiplication; and this consideration suggests the most fascinating branch of bacteriological study—the anti-toxins. For it is not the bacterial bacilli which kill, but their products which are inimical to the blood—just as the action of the fermenting microbe in yeast separates alcohol and sugar. And these products applied to an animal so as not to kill him produce in the blood other micro-organisms which are fatal to the first intruders. In this direction, perchance, the great future of medical science lies.

Sanitary Inspectors' Associations.

WESTERN BRANCH.

A meeting of this branch was held on Thursday, January 27th, at the Merchant Venturers' Technical College, Bristol, to hear an address by Dr. D. S. Davies, Medical Officer of Health, on the subject of "Some Methods of Investigation in Epidemic Diseases." Mr. W. J. Press, of Burnham, presided, and the hon. secretary, Mr. T. J. Moss Flower, read letters explaining the absence of the Mayor, the High Sheriff, and others.

Dr. Davies, who was well received, said the Sanitary Inspector was entrusted with the collection of the facts upon which the theory of causation was based, and upon the accurate collection of those facts the correctness of the theory, and therefore success in the prevention of disease, very much depended. Upon the knowledge of the natural history of disease depended the success of its prevention. One of the first steps towards an intelligent grasp of disease causation was a determination to rid one's self of any prevalent or popular idea such as that drains were the beginning, the middle, and the end of the causation of all infectious diseases. It was highly necessary to see that the drains of one's house were properly and scientifically constructed, but if Inspectors ran away with the idea that any disease, whether small-pox or scarlet fever, was wholly due to drains in one way or another, they would be hiding from view the possibility, and, in many cases, the certainty, that there were other causes at work spreading the disease. Dealing with the nature of infectious or communicable disease, he referred to the known existence of minute organisms which grew in or upon the tissues of the human body. The great majority of organisms performed useful functions, but a few flourished well at the temperature of the human body, and upon its tissues, and the ill-effects produced in the body were known as disease. Of course different organisms meant different diseases. By means of a blackboard Dr. Davies gave a table of diseases, and showed how they were usually communicated from one person to another, the

chief means of communication being the breathing of air containing the organisms. He explained the methods and means by which milk and other articles of diet became contaminated, and gave his hearers advice as to how they should set about to discover those methods and means. He impressed upon them the importance of systematic investigation instead of haphazard inquiries, and handed round specimens of the cards of instruction in use by the health department in Bristol.

YORKSHIRE BRANCH.

AT the annual general meeting of the Yorkshire branch of the Sanitary Inspectors' Association on Saturday, the 22nd ult. (Mr. T. Pridgin Teale, the president, in the chair), Mr. George Darley, superintendent of the Leeds scavenging department, read a paper on "The Destruction of Town's Refuse by Fire." Destructors, he remarked, had been in use in Leeds for twenty years. There were at the present time four, capable of consuming 80,000 tons of refuse per annum. When the first Leeds destructor (that at Beckett-street) was erected, the refuse was burnt by a natural chimney draught. Ten years later steam jets were added to the destructor, and these greatly increased the temperature. Similar jets had since been fitted to the other destructors in the city—at Armley, Kidacre-street, and Meanwood. The temperature obtained was from 1200 to 1500 deg. Fah. Mr. Darley affirmed that it would not be at all satisfactory to work a destructor without some means of obtaining the highest possible temperature either by steam jets or fans. He also added that the cost of dealing with a ton of refuse in Leeds was about 1s. 6d. A discussion followed, and, in reply to the president, Mr. Darley said the power for the forced draught in the destructor was got out of the refuse. Under the new system (Horsfall's) there was a comparatively small draught going up the chimney. Mr. Denham expressed the hope that small destructors, costing £30 or £40, would be made, so that in colliery villages the refuse from the pits might be got rid of. In reply to other questions, Mr. Darley said that about two-thirds of the refuse collected in Leeds was burnt. Tips were, of course, cheaper than a destructor for getting rid of refuse, but he condemned the use of tips. Dry ashes were largely used in Leeds on rhubarb fields.

CHINOSOL.

THE increased interest taken in the study of bacteria, and the identification of so many bacteria as the specific causes of disease, has brought the science of disinfection more and more into prominence. The number of so-called disinfectants or germicides has, in fact, grown to a bewildering extent, while the claims put forward would, if true, terrify all mischievous microbes out of their existence.

Probably the private purchaser buys what is most advertised without devoting any thought whatever as to the validity of such claims, but when large purchases are made for public bodies it often happens that the Medical Officer or the Analyst is asked to pronounce on the value of a given substance as regards its power of destroying dangerous bacteria.

To test the efficiency of a disinfectant it is necessary to bring it, in a given strength, into contact with infected matter, or with pure cultures of disease bacteria, and to ascertain whether after a stated time the disinfectant has succeeded in killing the bacteria.

Experiments of this nature are attended with considerable difficulty, and conclusions cannot at present be drawn with true scientific accuracy. Nevertheless, we can obtain what is for all practical purposes results that will enable us to say within moderate limits what strength will kill and what will not in a given time.

Besides germicidal power a disinfectant should have the power of destroying foul smells, and should, if possible, be non-poisonous.

All these properties are possessed in a marked degree by the substance we are considering, namely, chinosol. This body has a definite chemical formula, $C_9 H_6 N K S O_4$. It is a yellow chrystalline powder very soluble in water, and possessing a slight aromatic odour and an astringent taste.

Its germicidal properties are so surprising that they would hardly be credited were it not for the large amount of experimental work that has been done on it in America, Germany, and in this country.

It has recently been exhaustively tested by Mr. C. G. Moor (July, 1897), who examined its action on the bacteria of typhoid, diphtheria, anthrax, cholera, and on the chief organism of pus. His results show the germicidal power to be so great that even a tenth of an ounce in three gallons of water makes a reliable disinfecting solution.

Dr. Klein has (October, 1897) investigated the action of chinosol on bacillus subtilis, on anthrax spores, and on the staphylococcus pyogenes aureus.

The ability of a disinfectant to kill anthrax spores is a very strong proof of efficiency, and Dr. Klein states that a 1 per cent. solution of chinosol was fatal to them in five minutes, whereas they live for forty-eight hours in carbolic acid of five or six times the strength.

PLUMBERS, PLUMBING, AND PUBLIC HEALTH.

ON Friday, January 28th, Dr. MANSEL-HOWE, of London, delivered a lecture at the Town Hall, Maidstone, on "Plumbers, Plumbing, and Public Health." The Mayor of Maidstone presided, and there was a good attendance. The lecturer said much of the plumbing done to-day was not done by properly trained plumbers, with the result that much of the work was neither efficient nor reliable, and, unfortunately, exposed the inmates of many homes to disease which might and could be averted. Referring to the matter of sewer gas, he affirmed much sickness was traced to this finding its way into our dwellings, and stated that quite recently Professor Corfield and Dr. Payne had signified their belief in its powers of spreading typhoid. Dr. Robert Farquharson, M.P., had said:—"We all know that the modern system of drainage, if not carried out perfectly, is simply an elaborate machine for introducing disease into our homes." And Dr. Shirley Murphy had pointed out that the recent outbreak in Shoreditch was probably due to insuction of sewage matter into a defective water main. The lecturer advocated the soil pipe being

kept uniformly outside the house, and that both it and a separate relief pipe from the service drain should be carried to a point above the level of the highest portion of the house-roof, not too near to the chimneys.

He also contended that all inside waste-water pipes should constitute a system apart, and never communicate with the soil pipe or service drain, but made to discharge over an outside and properly-trapped gully. Similarly, all outside rain-water pipes should empty over outside gully traps, and never communicate with the soil pipe for the purpose of emptying their contents, and never with the object of serving as relief pipes. He further advocated efficient classes in connection with Technical Institutes for the better education and training of the rising generation of plumbers, and expressed the hope that Parliament would very shortly place the registration of plumbers under national recognition, so that when sanitary work had to be done, it might be undertaken by competent and responsible workmen. The lecture was illustrated with magic lantern slides, the subjects being for the most part examples taken from Dr. Vacher's work on plumbing defects.

Sir STUART KNILL, in moving a vote of thanks to the Mayor for presiding, stated that the Plumbers' Company were prepared to render any assistance in their power to the Authorities in improving the condition of sanitary plumbing.

The Rev H. COLLIS, Hon. Sec. to the Maidstone Technical School, thanked the Plumbers' Company for their assistance in connection with the establishment of classes for technical instruction for plumbing apprentices at the school.

THE SOCIAL AND SANITARY SOCIETY OF EDINBURGH.

THE work which has thus been carried on officially in Glasgow for twenty-five years has been done in Edinburgh since 1884 by voluntary visitors working under the auspices of the Social and Sanitary Society of Edinburgh. This Society divides the city into a convenient number of districts, appoints to each a superintendent—either a man or woman—and a staff of visitors. The duties of the visitors are practically the same as those of the women Inspectors in Glasgow, only their position is not official, and, their services being voluntary, their hours are not fixed, and they do not do so much work. On the other hand, there are more of them, the Society having on its books about two hundred visitors. These visitors consist principally of ladies recruited from the district visitors of the various parishes. They, therefore, have the advantage, or disadvantage as the case may be, of being personally known in the neighbourhood. They belong to all denominations.

The superintendents arrange for the visitation of each district, instruct the visitors to note insanitary conditions, and collect, tabulate, and forward to the Town Clerk the reports of the visitors. Cases requiring immediate attention are reported to the burgh Engineer or the Inspector of Cleaning and Lighting. Nine districts were visited in this way in Edinburgh last year.

The Society has done much valuable work. For eight years it directed its attention to the lighting of common stairs, keeping the matter before the Authorities by every means in its power, until at the present moment about 96 per cent. of the stairs are lighted and defaulters punished.

The inspection of dairies, byres, and milkshops has also been carefully considered by the Society's superintendents and visitors, and a scheme for further improvement in this direction is under consideration. The Society has been most active in suggesting and urging many reforms, some of which they have been mainly instrumental in carrying out. They have urged repeatedly the necessity of resident caretakers for common stairs, after the concierge system in foreign towns. They are still urging the necessity for various other improvements. Their most recent petition is that the Corporation should increase the number of Sanitary Inspectors, and that one or more of those appointed should be women.

The chief defect of the Social and Sanitary Association of Edinburgh is that it possesses no official status. Those who have worked in the poorer parts of great cities, in examining into the conditions of houses, factories, workshops, &c., know that it is far easier to get accurate information respecting existing conditions if the inquirers are armed with Government or municipal authority. The power of the law is a great lever in removing obstacles. It has been suggested that it might be possible by means of examinations to certify these visitors, and to register all those thus certified, supplying each with a card of registration signed by the Chief Sanitary Inspector of the city. The Sanitary Association of Scotland, which is the recognised examining body of Scotland, corresponding to the Sanitary Institute of England, only makes at present provision for examining in sanitary science with reference to sanitary inspectorships, but the board of directors is a strong and able one, and it is possible that were the need presented to them they might organise an examination in practical sanitary science (for persons who do not require the full Inspector's certificate), similar to that which is already held by the Sanitary Institute of England.

PUBLIC HEALTH PROGRESS IN THE QUEEN'S REIGN (1837—1897).*

By T. RIDLEY BAILEY, M.D., of Bilston.

REDUCTION IN THE GENERAL AND ZYMOTIC DEATH RATE.

Having now glanced at the progress made in certain departments of sanitary science during the Queen's reign, it is a natural step onward to examine the results as seen in the reduction of the general death-rate and the mortality from zymotic causes. A very instructive and interesting paper appeared in *Public Health* for June last, giving a comparison of the number and the causes of some of the deaths in England and Wales for the two periods 1838—42 and 1891—95, as found in the annual reports of the Registrar-General, from which most of the figures which follow are taken.

First, let me note that the population at the census of 1841 was very nearly 16 millions (15,927,867), and at the census of 1891, it had increased to just over 29 millions (29,002,525).

In the first quinquennium (1838—42) the mean

* Presidential address to the members of the Midland Branch of the Incorporated Society of Medical Officers of Health, October 7th, 1897.

mortality from all causes was 22,071 per million living, while in the last quinquennium it had fallen to 18,738 per million, or a decrease of 15·2 per cent. of the mean rate. In other words, instead of the 2,785,931 deaths registered in the last-named period there would, if the old rate had continued, and with the increased population, have been 3,280,850, or 495,459 more than the actual record, giving an average yearly saving of 99·091 lives.

The significance of this statement is even increased when we enter a little into detail and realise that more than half of this saving is due to the reductions from zymotic—which are preventable diseases.

The following are the averages of these diseases as given by the Registrar-General in his annual report for 1895:—

ENGLAND AND WALES.

	Rate per million living. Quinquennium.		Change in rate, per cent. of rate 1838—42.
Small-pox .. .. Chicken-pox ..	576	29	−95·0
Measles	539	408	−24·4
Scarlet fever .. Diphtheria	797	435	−45·6
Whooping-cough	504	398	−21·1
"Fever"	1053	185	−82·5
Diarrhœa .. .. Dysentery	254	630	+148−0
Cholera	44	21	−52·3

The greatest decrease is seen in the rate from small-pox, fever (typhus, enteric and simple continued), and cholera, and these have already been discussed.

The mortality from scarlet fever and diphtheria combined shows a deduction of 45·6 per cent., but the deaths from scarlet fever alone indicate a still greater reduction. In the decennial period 1851—61 the deaths from this disease were 88 per 100,000 of the population, and, notwithstanding fluctuations, there has been a steady, continuous diminution, until at present the average is only 17 or 18 per 100,000, or less than a quarter of what it was forty years ago. This reduction is due to several causes, (1) to the more thorough isolation of the sick and the destruction or disinfection of fomites; (2) to our increased knowledge of its etiology, whereby we are able to recognise the possibility of infection through milk—sometimes by direct contamination, *e.g.*, from persons in the dairy who suffer from the disease, or, as has been demonstrated by Power, Klein, and others, from a corresponding disease in cows ("Hendon cow disease"); and (3) to a more accurate means of diagnosis whereby cases formerly recorded as scarlet fever would now be recognised as diphtheria.

On the other hand, the increase in diphtheria has been very marked, not only in the number of cases but also in fatality. In the five years, 1859—63, the deaths from diphtheria were 95 per million, whereas in the similar period, 1891—95, they were 253. Various theories have been suggested in explanation of this very serious result, but time will not allow me even to mention them. It must suffice to state that our improved knowledge of its causation and methods of spread, while still obscure, justify us in the hope that it will soon be possible for us to bring it, as we are bringing the other infectious diseases, under the control of sanitation.

The following table, taken from the paper already mentioned, will show at a glance the saving of life resulting solely from the diminutions which have taken place in the mortalities from the zymotic diseases during the five years referred to, and will be far more eloquent than any words of mine :—

	Deaths in five years, 1891—95 Recorded.	"Old Time's" rate.	Gain or loss of lives. Five years.	Annually.
Small-pox Chicken-pox	3,515	85,622	+82,107	+16,421
Measles ..	60,584	80,122	+19,528	+3,905
Scarlet fever .. Diphtheria	64,846	119,471	+54,625	+10,925
Whooping-cough	59,142	74,920	+15,778	+3,155
"Fever"	27,546	156,528	+128,982	+25,796
Diarrhœa .. Dysentery ..	93,986	37,757	−56,229	−11245
Cholera	3,188	6,540	+3,352	+670

Mean population 1891—95, 29 732,504.

In this brief and most imperfect survey of public health progress during the past sixty years, no mention has been made of phthisis, puerperal fever, of diarrhœa, and of other diseases which require consideration, nor has anything been said of the evolution of sanitary laws and the extension of local government, of the improvement of our food supply and the more systematic examination of meat, fish, and other articles of diet; of the endeavours made to discover and prevent the spread of tuberculosis from the consumption of the flesh of infected animals; of the whole subject of bacteriological research and the development of the idea of inoculation for the prevention or modification of disease, and of the marvellous advances, too, in the hygiene of the Army and the Navy. Time will not allow of more than the bare enumeration of these matters, each of which might be made the subject of an extensive and interesting paper.

From the story of the past, however, we have every cause for congratulation and thankfulness. In the midst of great difficulties the men who were the pioneers of sanitary medicine raised it to a science, and from the history of their doings we may gather inspiration for further endeavour. It is the high privilege of sanitarians to be the leaders of the nation in social questions of the highest importance, and adequately to perform their duty they should be secure in the tenure of their office, receive a due appreciation of their position, a fair salary, and complete independence of local control. It is of the essence of their calling to teach statesmen and the other leaders of thought in the country the medico-physiological view of every matter, whether physical or moral, that affects the health of the people. It is our duty to say that every man should have the opportunity to earn a minimum living wage, and, conversely, that no man should be kept by the State who is strong and skilful enough to keep himself; that sweating in any trade and preventable accidents are detrimental not only to individuals but to the general interests of the community, and should not be allowed; that unhealthy trades should be further regulated by the State and their ill-effects counteracted; that the reform of our workhouses and prisons, and an improvement in their administration, is but a necessary obligation of our civilisation. Every locality, too, should be provided with suitable healthy dwellings for the artisan classes, let at such rents as the wages of the district will fairly cover, and where these do not exist the Sanitary Authority

should supply the need. Back-to-back houses should be absolutely prohibited. It is a check to pride in our sanitary progress that in Glasgow 20 per cent. of the population reside in single rooms, and that in the United Kingdom, according to the last census, over three million persons live in overcrowded tenements.

Recreation grounds or open spaces should be found in every town, and the mental over-pressure of children from the system of cram in education should be prevented by sounder psychological methods.

A proper system of sick nursing for the poor—that is for those not sufficiently destitute to be removed to the workhouse, and yet unable financially to provide for themselves—should be part of the regular equipment of every town and district. Whether this should be by the institution of State hospitals, or by the addition to the staff of every Sanitary Authority, or Board of Guardians, of one or more district outdoor nurses (in proportion to the number and needs of the population) who should be as much officers of the Authority as the Medical Officer of Health or the Poor Law Medical Officer, and whose services in all cases, infectious or otherwise, should be (under proper regulations, of course) at the disposal of all sick people, poor enough to be entitled to them, is a point for discussion.

These, gentlemen, are some of the things in which it is our duty to advise and to guide. In some of the most important matters that concern the well-being and the well-doing of every member of the community from his entrance into the world to his solemn exit, we have direct and serious responsibilities.

It should be our constant aim to favour and to create such a view of all matters that lie under our authority that every citizen, whatever his sphere of life, should grow up in such conditions—physical, mental, and moral—as will make the product—the whole man or woman—the best that could result from the initial germ. Too high a view cannot be taken of our positions as guides in sanitary medicine, and when we realise that the result to humanity of our labours is to prevent disease, to decrease, and where possible, to banish sickness and suffering, to diminish mortality, to prolong life, with all the consequent gain—in comfort, in freedom from pain, in true happiness, in usefulness of service, ay, and in measurable money value—I think we shall, one and all, be encouraged, more than ever, to renew our efforts and to labour on, each in his own sphere—

"In the unfailing hope, although
It be not granted us to see,
Yet that the coming age shall know
We have not wrought unmeaningly."

PRAISE FROM "THE LANCET."

THE TESTIMONY OF A GREAT MEDICAL JOURNAL TO THE MERITS OF MR. DIBDIN'S BOOK.

THE following review of Mr. Dibdin's "Purification of Sewage and Water" appeared in last week's issue of *The Lancet*:—

"Mr. Dibdin's work, in his recent capacity as chemist to the London County Council, is well known. He has had peculiar opportunities for studying great sanitary problems, and that he has not studied them in vain is evident from the work published from time to time in the official reports of the London County Council, and now practically summarised in the convenient form of the book before us. At once we may say that it is a most interesting work. It deals, for instance, with the recent developments in the treatment of sewage by bacteriological methods. Years ago we maintained in these columns that in principle the treatment of sewage with chemicals was illogical and wrong. Nature provides a method of purification, and, like all nature's operations, it is not a wasteful process. Chemical treatment, it is true, consolidated sewage and rendered it to some extent inoffensive, but that is all; nobody could use the product with any profit, and it was difficult to dispose of it satisfactorily. The study of the conditions under which the specific organisms work favourably has revealed, as Mr. Dibdin has shown, the possibility of employing these microscopic engineers to do the work not only of removing what is a source of offence and pollution but of converting it into a harmless, and, indeed, a valuable product. Instead of, for example, the solid matters of sewage being separated by chemical precipitation to serve no end and not improbably become a danger to the public health, it may be converted, by the silent but certain operations of specific micro-organisms, into nitrates, carbonic acid, and water, all of which are essential to plant life. Thus the great cyclic operations apparent in all nature's work are completed, whereas by chemical treatment they are impeded with, as might be anticipated, unsatisfactory result.

Mr. Dibdin has contributed, as the present work shows, not a little to the satisfactory solution of this vitally important problem. His instructive and interesting experiments with the sewage discharge at the great London sewage outfalls are convincing on this head. Mr. Dibdin's every-day duties as chemist to the London County Council also have brought him intimately into contact with the question of the purity of the London water supply, and his work in this direction has been repeatedly referred to in the columns of the *Lancet*. Notably, there is the inquiry he conducted under the auspices of the Council into the available sources of supply in Wales, and he certainly did good work when he caused considerable activity amongst the metropolitan water companies by his comparatively recent and unfavourable remarks upon the quality of metropolitan water, which were based chiefly upon more careful attention being paid to the kind and amount of suspended impurity. Mr. Dibdin has devised a micro-filter, which serves not only to estimate small quantities of suspended matter, but in isolating it to enable some idea of its nature to be gained. All these and kindred subjects are dealt with in the book. It need hardly be added that the book is sure to be held in estimation by all those interested in sanitary advance. It is an accurate and valuable gauge of the present position of matters relating to the more pressing questions of modern hygiene."

AN important meeting of Plumbers was held at Exeter on Saturday last, a report of which will appear in our next issue.

General News.

HOME.

NOTICE.—On and after 31st March next the Annual Subscription to this Journal will be raised to 12s. 6d. to all NEW Subscribers. NO ADVANCE will be made to our friends whose names are entered on our Subcription list prior to that date, so long as they continue to Subscribe.

YNISHIR.—Diphtheria is raging at Ynishir, and during last week two children succumbed to the disease.

RIPLEY.—The Local Government Board has sanctioned a loan of £2710 for water supply to the outlying wards.

BILSTON.—The Urban District Council has resolved to apply to the Local Government Board for power to borrow £6500 for waterworks purposes.

BOLTON.—A Local Government Board inquiry has been held respecting an application for sanction to borrow certain sums, including £10,255 for refuse disposal.

FARRINGDON.—A Local Government Board inquiry has been held into the scheme for the proposed water supply, and the loan of £4000 for carrying it out.

SOUTHAMPTON.—A Local Government Board inquiry has been held relative to an application by the Corporation to borrow the sum of £1080 for the purpose of erecting public conveniences.

PORTLAND.—The Local Government Board has sanctioned the application of the Portland District Council for power to borrow the sum of £35,000 for completing a scheme for supplying the island with water from Upwey.

HORNSEY.—The engineer is preparing plans and estimates for the erection of the new bath and discharge rooms at the isolation hospital, the Local Government Board having sanctioned the borrowing of the estimated amount of the cost.

NORTHWICH.—A Local Government Board inquiry has been held in response to an application by the Rural District Council for sanction to borrow £520 for works of water supply for the townships of Cuddington, Hartford, and Weaverham.

DOVER.—The International Sanitary Association have offered to construct two underground lavatories, one in the Market Square and one at the top of Biggin-street, near the Town Hall, and they propose to recoup themselves by charging a penny for the closets, twopence for the lavatory, allowing the stalls to be free.

DUNTOCHER AND DALMUIR.—A commencement has been made with the construction of a new reservoir for the Clydebank, Duntocher, and Dalmuir Water District at Greenside on the Kilpatrick Hills. A Provisional Order for this purpose was obtained by the County Council of Dumbarton last year, as owing to the rapid growth of Clydebank it was found absolutely necessary to augment the water supply. The work of construction will cover three years, and the cost will be between £30,000 and £40,000.

HARTLEPOOL.—The Gas and Water Company is promoting a Bill in Parliament for extending the waterworks.

HYTHE.—A Committee has been appointed by the Town Council with a view to finding means to increase the water supply.

BRIGHOUSE.—The Joint Hospital Board has decided to ask for the sanction of the Local Government Board to borrow the sum of £3700, making a total of £11,000 spent on the hospital premises.

BARRY.—A Local Government Board inquiry has been held into applications for power to obtain several loans, including £7950 for new works of water supply, including new mains, £1750 for new pumping engine, and addition to the existing building.

HEYWOOD.—Dr. Wisken, the Medical Officer of Health for Heywood, has decided that the day-schools of the town must remain closed for another week owing to the prevalence of measles. This will be the fourth week that they have been compulsorily closed.

NEWBURGH.—Mr. G. B. Macdonald has got his material forward at the school for carrying out the drainage portion of the new sanitary arrangements. The plans provide for an entirely new system of lavatories, closets, &c., costing about £350. But the advantages over the present very inadequate dry system in a school of nearly four hundred pupils are too obvious to require to be mentioned. The work will occupy about three months.

SELBY.—A County Council inquiry has been held into the subject matter of a report by the County Medical Officer to the effect that an isolation hospital or hospitals ought to be established for the use of the inhabitants of the Selby urban district, and for the rural district of Selby. The chairman said that the committee was satisfied that there was necessity for an infectious hospital in the district, and would make a report to the County Council.

BIRMINGHAM.—The Health Committee of the City Council recently discussed at some length the subject of the cleansing of courts, the shocking state of some of these places having been prominently brought under public attention at the Coroner's Court. The Committee has now decided to recommend the Council to authorise it to exercise oversight in the matter, and to cleanse the courts where desirable, charging the cost to the occupiers of the premises. We understand that the Committee contemplate the employment of twelve scavengers and a foreman for this purpose, the cost involved being estimated at £1000 a year.

GOOLE.—Proposals for purifying the Goole water were discussed at a recent meeting of the Gas and Water Committee. It was felt that a temporary expedient must be adopted at once. Even if the committee eventually decided to go to Heck, at least three years would elapse before this could be accomplished. Two alternative proposals were before the committee, one being to purify the water from the new bore by the Pulsometer system, and the other to utilise the pure water from the bore at Rawcliffe Bridge, and to soften, by the Mather and Platt process, sufficient water from the old well. The further consideration of the matter has been adjourned.

CORNWALL.—The Sanitary Committee of the County Council reports that the cases notified during December under the Infectious Diseases Act amounted to 205 against 85 in November. This is due to the typhoid fever epidemic at Camborne, the cause of which is at present being investigated by the Local Government Board Inspector.

SCOTLAND.—The Local Government Board for Scotland has issued draft regulations for regulating the duties of Medical Officers of Health and Sanitary Inspectors under the new Public Health Act. The Board understands the Act to imply that the initiative shall be taken by the Local Authority, and these regulations are put forward only for guidance and as suggestions. The draft indicates clearly what the Board may be expected to approve, and their approval is necessary under the Act.

Personal.

MR. T. G. DICKSON has been apppointed Medical Officer for the Radnorshire District of Hay.

MR. J. M. BENNETT has been appointed Medical Officer for the Ruddington District of Basford.

MR. J. BUCHANAN has been appointed Medical Officer of the Watford district of Watford Union.

MR. J. G. MILNES has been appointed Medical Officer for the Gislingham District of Hartismere.

MR. RICHARD JONES, M.D., has been appointed Medical Officer for the District Council of Festiniog.

MR. F. A. HALLAWORTH has been appointed Medical Officer for the Bodenham District of Leominster.

MR. G. HUDSON has been appointed Medical Officer of the Mildenhall Workhouse, and of the Worlington district.

MR. J. T. HALLAM has been appointed Assistant Surveyor for the urban district of Fenton, at a salary of £100 per annum.

DR. A. H. SMITH, of Yarm, has been appointed Medical Officer and Vaccination Officer for the Yarm district of Stokesley.

THE Town Council of Nelson has increased the salary of Mr. C. T. Copley, Assistant Borough Surveyor, by £25 per annum.

DR. NIELD COOK, D.P.H., Health Officer of Madras, has been appointed Health Officer of Calcutta, in room of Dr. Simpson.

MR. F. W. MAGER, Sanitary Inspector to the Dorchester Rural District Council, has been appointed surveyor for the Rural District of Walsall.

MR. J. W. HARRISON, A.S.I., Assistant Sanitary Inspector for Bradford, has been appointed additional Building Inspector for the borough of Birkenhead.

DR. ANNINGSON has been appointed Medical Officer of Health for the district of Royston, and Mr. H. N. Woodward, Sanitary Inspector, at salaries of £20 per annum.

MR. PHILIP E. PILDITCH has been appointed as one of the surveyors and umpires to the Board of Trade.

G. HOPE, L.R.C.P., M.R.C.S., has been appointed Medical Officer for the Seventh Sanitary District of the Brentford Union.

C. C. BRODRICK, L.R.C.P., L R.C.S., has been reappointed Medical Officer of Health for the Rural District of Tavistock.

M. M. HAILEY, L.R.C.P., L.R.C.S., has been reappointed Medical Officer of Health for the Urban District of Newport Pagnell.

H. T. EVANS, M.R.C.S., D.P.H,, has been appointed Medical Officer of Health for the Bedwellty Urban Sanitary District, vice J. T. James resigned.

Sewerage Schemes.

[TO MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

THE Middleton Corporation has been granted six months' extension of time for the completion of the sewerage works.

A LOCAL Government Board inquiry has been held at Epsom with reference to the compulsory purchase of land for the Ashtead drainage scheme.

THE Corporation of Glasgow is promoting a Bill to confer upon it powers to acquire additional lands, and to construct additional works for sewage disposal purposes.

IT appears that a writ has been issued against the Dunstable Corporation owing to the alleged discharge of sewage matter and surface water from the Corporation's drains.

A LOCAL Government Board inquiry has been held at Warminster into the new sewage scheme for the town, to carry out which the Urban District Council had made application for sanction to borrow £5000.

A LOCAL Government Board inquiry has been held into an application of the Evesham Rural District Council for sanction to borrow £2000 for sewage works at Badsey. The Parish Council of Badsey opposed, chiefly on account of cost.

MR. SANTO CRIMP, of Messrs. Taylor, Sons, and Santo Crimp, has been conferring with the Dunstable Council on the proposed sewerage to be carried out for the borough, and it has been proposed to unite Houghton Regis in the sanitary area. Mr. W. H. Leete, the County Surveyor, has submitted a scheme on the broad irrigation of the intermittent downward filtration principle. The estimated cost is £6000.

A LOCAL Government Board inquiry has been held at Market Harborough into the application of the District Council for sanction to borrow £3550 for purposes of sewerage and sewage disposal for the parishes of Kibworth, Beauchamp, and Kibworth Harcourt.

A DEPUTATION of gentlemen from Hamburg visited the Barnhurst Sewage Works of the Wolverhampton Corporation on January 27th, for the purpose of inspecting their construction. Last year Russia sent representatives to Wolverhampton to inspect the sewage works.

THE Committee appointed to inquire into the cause of the pollution of the river Brent reports that the pollution has been traced to the sewage farm of the Hanwell Urban District Council, and the solicitor has been instructed to serve the Council with notice to abate the nuisance.

AT a recent meeting of the Penybont Joint Sewerage Board it was decided to adopt the sea outfall scheme submitted by Mr. Cousins, of London, with the supplementary scheme for carrying the outfall channel below low-water mark 1400 yards. The total estimated cost was £19,462.

A LOCAL Government Board inquiry has been held at Enderby into the application of the Blaley Rural District Council to issue a Provisional Order to empower the Council to obtain land required for works of sewerage and sewage disposal for Enderby, and for sanction to borrow £5000 for the purpose.

THE Urban District Council of Bexhill-on-Sea has just approved a complete sewerage scheme for Little Common, within the district, and has given instructions for the necessary plans and estimates to be prepared and sent to the Local Government Board with a view to an inquiry. The estimated cost is £4000.

THE bacteriologicsl system of sewage disposal is being adopted at Farnborough. Considerable interest is evinced in a scheme for extending the sewerage of the district, which is being prepared by the Surveyor at the request of the Council. A house-to-house sanitary inspection of the district is being made, and there appears to be a general desire for rapid sanitary progress.

Lighting.

THE Corporation of Gravesend is applying for an Electric Lighting Provisional Order.

IT is proposed by the Electric Lighting Committee of Islington Vestry to extend the electric lighting mains to Highbury. The adoption of the suggestion would confer a great boon upon the tradespeople of the neighbourhood.

THE Corporatlon of Brechin is applying for an Electric Lighting Provisional Order.

A COMMISSION has been given to Mr. William Arnot, lately electrical engineer to the Govan Corporation, to report on the subject of electric lighting.

THE Urban District Council of Aldershot has applied for a Provisional Electric Lighting Order under the provisions of the Electric Lighting Acts, 1882 to 1890.

THE Local Government Board has sanctioned the application of the Chesterfield Gas and Water Board for a loan of £15,000 for the partial fitting up of the new retort house.

THE Chelmsford Rural District Council has applied for a Provisional Order for the electric lighting of the parishes of Writtle, Great Baddow, Broomfield, Springfield, and Widford.

THE Town Council of Glossop has appointed a sub-committee to interview the manager of the Municipal Electric Supply Company, who are offering to furnish the borough with an electric light installation.

THE Chester Corporation has adopted a resolution of the Lighting Committee recommending that a feeder be laid to increase the pressure in the electric lighting mains in Brook and Foregate-streets, at a cost of £2050.

THE Wallasey Council has received the sanction of the Local Government Board to the borrowing of £8000 for gasworks purposes, and has also received the draft provisional order for power to borrow £40,000 for gasworks purposes, which were the subject of the inquiry held in November last.

THE Melton Mowbray Electric Light Company, Limited, are applying for an Electric Lighting Provisional Order in respect of the urban district of Melton Mowbray, and the parishes of Sysonby, Welby, Eye, Kettleby, Burton Lazars, and Thorpe Arnold in the rural district of Melton Mowbray.

THE scheme of electric lighting for the principal streets of Sunderland has recently been brought into operation. The illumination is obtained from large arc lamps placed at frequent intervals along the main thoroughfares, and the new lights improve the appearance of the town at night very much.

THE Ilford Urban District Council has adopted the report of the Electric Lighting Committee which recommended the Council to approach the Great Eastern Railway Company with a view to purchasing a piece of land adjoining Sylvan-road, Ley-street, as a site for the electric lighting station.

THE distinction of being the first village in the kingdom to be lighted by electricity is now claimed for Clapham, in the neighbourhood of which the High Sheriff of Yorkshire, Mr. J. A. Farrer, resides. Owing to the generosity of Mr. Farrer, it appears that for nearly two years the streets of Clapham have been lighted by electricity, a nominal charge of half-a-crown per annum being levied on each house.

AT a recent meeting of the Royal Scottish Society of Arts at Edinburgh, Mr. D. Bruce Peebles showed and described a simple generator for the production of acetylene gas. The machine, he said, was of an automatic type, and he fancied no one would have the slightest difficulty in making gas with it. A tank and gasholder were common to this class of machine, and it was only in details that improvements could be made. What he claimed was that he had made a very simple apparatus for opening the water supply as needed, and by which a number of generators or retorts could be used with a small gasholder. Following the description, a photograph was taken to demonstrate the actinic power of the light provided by acetylene gas.

THE Gas Committee of the Hull City Corporation met on the 25th ult., when the negotiations for the purchase of the Kingston Gasworks by the Corporation for the sum of £92,500 were practically complete. An offer was received from the Sutton, Southcoates, and Drypool Gas Company to supply the Corporation with all the gas it required for the area of the Kingston Gas Company at 1s. 6d. per 1000 cubic feet. The charge of the latter company is 3s., and it was arranged that the consumers should under the altered circumstances be supplied at 2s. 8d. per 1000, the balance between 1s. 6d. and 2s. 8d. to be applied towards the reduction of the increased burden caused by the purchase of the works. When that is discharged, then the price of gas will be further reduced to consumers, and the balance remaining applied to the relief of the general rates.

FOR some months past the question of lighting the Victoria Embankment and Westminster and Waterloo Bridges with electric light has been under the consideration of the Highways Committee of the London County Council. It is now proposed that 144 arc lamps shall be provided. The lamps on each side of the carriage-way of the Embankment will be 240ft. from each other, those on the parapet wall about 66ft. apart, whilst those on Westminster Bridge and in the Northumberland Avenue approach will be placed at convenient distances. It is proposed that the whole of the parapet lamps and the alternate lamps on each kerb of the Embankment, and also some of the lamps on Westminster Bridge, should be extinguished at midnight, thus decreasing to an appreciable extent the cost of maintenance. The capital expenditure for the installation will probably be about £25,300, of which over £20,000 would be for the building and equipment of the generating station and the laying of the mains. The probable annual cost of maintenance is stated at £3509.

Law Cases.

ALLEGED SMOKE NUISANCE.

(MILLARD *v.* WASTALL.)

THIS was an appeal in the Court of Queen's Bench, by case stated, from the decision of justices, dismissing an information under the Public Health Act, 1875, Section 91 and the following sections, charging the respondent with committing a nuisance by permitting black smoke to be discharged from a chimney not being a chimney belonging to a dwelling-house. A preliminary objection was taken to the information that the notice on which it was founded did not set out the works required to be done to remedy the nuisance. The objection was allowed, and the information was dismissed. Section 94 provides that the notice shall be a notice requiring the person causing the nuisance "to abate the same within a time to be specified in the notice, and to execute such works and do such things as may be necessary for that purpose."

Mr. F. LOW, for the appellant, contended that it was not in all cases necessary to specify in the notice works to be done in order to abate the nuisance, because in many cases, as in the present, no works were necessary.

The respondent was not represented.

Mr. JUSTICE DAY, in allowing the appeal, said that it was not necessary for the Local Authority to invent works to be done by persons whom they required to abate a nuisance. All that was required in the present instance was that the respondent should refrain from using such coal as caused the emission of black smoke from his chimney.

Mr. JUSTICE LAWRENCE said that it was no more necessary to prescribe works to be done to abate a nuisance of black smoke than it was to abate a nuisance caused by keeping a pig.

NEGLECTING TO REMOVE REFUSE.

MR. HENRY MANDY SIMMONS, of St. Leonards Villa, Seaside-road, Eastbourne, was summoned by the Corporation of Eastbourne, who sued defendant under Section 49 of the Public Health Act to recover £4 0s. 6d. for expenses incurred in removing an accumulation of filth.

The TOWN CLERK (Mr. H. W. Fovargue) prosecuted, and Mr. F. LAWSON LEWIS defended.

Evidence was given by Mr. Mitchener (Sanitary Inspector for the East Ward) and Dr. W. G. Willoughby (Medical Officer of Health).

An accumulation of manure near defendant's slaughter-house at Lower Drove was considered a nuisance by Dr. Willoughby and was removed by the Corporation, who sold it (110 loads to Mr. Duly of Roseland's at 1s. a load (£5 10s.). The cost of removal was £9 10s. 6d., and the Corporation therefore sued for £4 0s. 6d.

Mr. Simmons was called as a witness. He said the stable manure was not in any part of the yard attached to the slaughter-house. It was in the field next to the slaughter-house field.

Mr. LAWSON LEWIS: Under any circumstances would it be reasonable to sell manure at 1s. a load when it costs you 1s. 6d. to deliver it?

Mr. Simmons: I should say not. We were

selling at the time at 5s. a load delivered at the New College to Mr. R. F. Winch, the master who has just left.

By the Town Clerk: I sold manure to Mr. Whatmore at 1s. 6d. on the spot.

Mr. G. Whatmore, of 19, Commercial-road, said he agreed to buy the manure, and on going to remove it he found that the Corporation were taking it away.

The Bench ordered payment of £3 2s.

The CHAIRMAN said they did think the action of the Corporation had been rather summary. It was a little unreasonable, remembering that the heap had been there for a long time, and was the growth of months to go on a given day, and say "if you don't instantly remove it we shall have to put in force the provision of this statute."

DRAINAGE DISPUTE.

A NOVEL legal point has arisen in the case of Andrews *v.* the St. Olave's District Board of Works, which came before his Honour Judge ADDISON, Q.C., at Southwark County Court.

The action was a claim by the plaintiff, William Joseph Dawes Andrews, a solicitor, and the owner of houses in Vine-street, Tooley-street, to recover the sum of £24 9s. 2d. from the defendants, the St. Olave's District Board of Works, for work done.

Dr. BALL argued the case for the plaintiff, and Mr. MACMORRAN, Q.C., for the defendants, the facts not being in dispute.

It appeared that the plaintiff had served upon him in April last notices to remedy defects in the drainage of two of his houses. Plaintiff's surveyor had the ground opened up, and then discovered that the drainage of the two houses was combined.

Mr. MACMORRAN pointed out that in law, though quite contrary to common sense, if a man combined the drains of two houses in London surreptitiously and without the sanction and approval of the Sanitary Authority, then such drains became a sewer, and was repairable by the parish, but if he were ordered to combine them by the Local Authority then they remained drains, which had to be kept in order by the owner.

On finding that these drains were combined, the Surveyor paid a visit to the Record-office of the London County Council to ascertain whether an order has been made by the Sanitary Authority which existed at the time the drainage was laid down, and which would make them private drains. Finding, as he then thought, that such an order had been made, plaintiff carried out the work. When it was completed, however, the Surveyor discovered that he had made a mistake, and that no such order as he supposed existed had been made, consequently the drains were a sewer and repairable by the defendants. Thereupon the plaintiff brought this action to recover from the Local Authority the money he had expended upon executing the work, namely, £24 9s. 2d.

His HONOUR, in giving judgment, said he could find no ground in law upon which plaintiff was entitled to succeed and recover the money he paid. There would be judgment for the defendants, with costs.

Correspondence.

We do not in any way hold ourselves responsible for opinions expressed by our correspondents.

(*To the Editor of* THE SANITARY RECORD.)

THE INFECTIOUS DISEASES NOTIFICATION ACT, 1889.

HOW IT WORKS IN RURAL DISTRICTS.

SIR,—As a matter of public interest I have thought it a duty to call attention to what I consider, and what I have proved to be in my official capacity of Sanitary Inspector, defects (serious defects) in the Act above referred to.

My remarks apply to the working of the Act in large rural districts, and I may here mention that my district is a large one, having an area of 32,000 acres and about 100 miles of highways. The Act was adopted by my Council, then the Rural Sanitary Authority, previous to my appointment in March, 1890; I have therefore had nearly eight years practical experience of the working of the said Act.

The particular section to which I desire to call the attention of my fellow-sanitarians who are entrusted with carrying out the conditions laid down in the Act is Section 3 (*b*), wherein it reads:—"Every medical practitioner attending, or called in to visit, the patient shall forthwith, on becoming aware that the patient is suffering from an infectious disease to which the Act applies, send to the Medical Officer of Health for the district a certificate," &c.

My object in writing you is with a view of ventilating this question of notification of infectious diseases and getting an expression of opinion and experience of others on the working of the Act in large rural districts.

The weakest point in the Act and Section mentioned, in my opinion, is, "shall forthwith notify to the Medical Officer of Health," this, I contend, is wrong, and the words "Medical Officer of Health" should read "the Sanitary Inspector," where the Act is adopted in rural districts, for the following reasons:—

In a large rural district, the principal population being agricultural and other labourers, the earnings of these men are very small compared with the town mechanic; consequently, when a member of the family becomes ill, they naturally defer calling in the family doctor as long as they possibly can, and the disease is therefore, in the majority of cases, in an advanced stage, and the doctor can therefore at once form a true diagnosis of the disease from which his patient is suffering.

We will now assume the patient to be suffering from scarlet fever, and there are eight or nine in family (in a six-roomed cottage—the maximum size in rural districts), and the family doctor having a large practice, and the house one, or, say, five miles from his surgery. We may at once take it for granted that the certificate under the Act referred to will not be forwarded to the Medical Officer of Health until the last post at night (and even this is more than we can reasonably expect from a busy medical practitioner). The Medical Officer of Health receives it in due course; he then in turn forwards the same on by post to the Sanitary Inspector, who may be, and most probably, if

he be a worker, will be from home, miles in the country, and when coming home late in the day tired, he is not fit or equal to undertaking another journey to investigate the case of which he has received notification from the Medical Officer of Health.

All this correspondence you will readily see must occupy from three to four days, and during this time several other members of the family may have contracted the disease, and, to say nothing of the suffering, some cases may, and have, proved fatal. When all of this could have been prevented, in districts like my own, where we have an isolation hospital, were only the Act made to read "Sanitary Inspector" in the section referred to instead of "Medical Officer of Health."

And still another difficulty frequently occurs; after all the delay of three or four days, as described above, the Inspector visits the house to find the doctor has left instructions for him (the Inspector) to the effect that he must on no account remove his patient, or he may die on the way. Thus the house, small as it is, badly lighted, insufficiently ventilated, and to some extent overcrowded, has to be left a centre of infection probably in a large village, when all this suffering and spreading of the disease might have been prevented.

I may, therefore, say in conclusion, if the notification Act is ever to be in the rural districts, what it was no doubt intended to be, for the prevention of the spreading of infectious diseases — in my opinion, derived from eight years experience with the Act, the medical practitioner visiting patients in the rural districts must send their certificates direct to the Sanitary Inspector.—Yours faithfully,

H. T. SIDWELL, C.E., F.I.S.E., A.S.I,
Surveyor and Sanitary Inspector to the Blean Rural District Council.
Herne, near Canterbury, January 26th.

THE VACCINE MARKS THEORY.

SIR,—The question of vaccine marks has been raised in your excellent SANITARY RECORD in the interesting article by Dr. T. Ridley Bailey which appeared in your issue of January 14th. I should like to be permitted to offer a few observations. The *Lancet* says:—"Among the best ascertained points in the matter of vaccination is the fact that the protection is in proportion to the number and size of the vesicles produced, which leave pitted cicatrices." Permit me to say that this authoritative dictum, so unhesitatingly pronounced, is by no means generally accepted by the profession. The medical vaccination census (Dr. Makuna's "Transactions of the Vaccination Inquiry") was taken with a view of settling the "vexed" question of vaccination from the medical side for ever, and particularly to turn back the tide of revolt against vaccination law.

The circular drawn up by the Exeter Hall Committee contains seven questions, and was sent to 4000 medical practitioners, including all the Public Vaccinators, Medical Officers of Health, &c. Of these questions, No. 4 refers to the quality and quantity of vaccination as determined by the cicatrices. An analysis shows that 27 medical men consider one cicatrix sufficient for all purposes; 25 require two; 54 recommend three; 92 prefer four; 10 insist on five; 5 desire six; whilst 28 declare that protection against small-pox is in proportion to the number of cicatrices, the more the better. Dr. A. W. Jacob, F.R.C.S.I., Dublin, avers that:—"Cicatrix supplies doubtful evidence of protection." Dr. M. S. Bernard Roth, F.R.C.S.:—"One well-marked cicatrix is as good as half-a-dozen." Dr. James Matthews "has several times proved that one good cicatrix is as good as a dozen." Dr. G. F. Henry, L.R.C.P., Bury St. Edmunds, declares:—"One is as efficacious as fifty." Dr. D. H. Cullimore, London, "has seen some of the worst cases of small-pox amongst the re-vaccinated Sepoys with many marks, and some of the mildest amongst the non-vaccinated Indians." Dr. C. H. Hill, London, says:—"The worst case I ever saw of post-vaccinal small-pox presented the very model of a vaccinated arm." Dr. C. Holmes deprecates many cicatrices, from which he has "seen serious local mischief," and so on throughout, one condemning *in toto* what another brother practitioner finds in every way desirable. The result of this medical vaccination census has been to establish, according to the vaccinatists:—First, absolute certainty (on the evidence of two-thirds of the entire body of medical experts) as to the danger of imparting serious and fatal diseases by the operation. Secondly, the greatest uncertainty as to the protection (if any) afforded. Thirdly, utter contradiction and confusion as to the mode of the operation, the kind of lymph required, the number of punctures necessary, and the advantages to be derived from the compulsory enforcement of the practice.

Such are the *dicta* of medical science concerning a prescription which has been vaunted as the greatest and most beneficent discovery in the history of medicine. Yet this prescription is so frequently attended with mischievous and sometimes fatal results, that thousands of intelligent Englishmen refuse to accept it without the aid of the policeman, and prefer to undergo the seizure of their household goods and the prison cell. It is to be hoped that when Parliament meets consideration will be given to the unanimous recommendations of the Royal Commission as disclosed in the final report, and that the result of the deliberations may be the total disestablishment and disendowment of this cruel and mischievous system.—Yours faithfully, JAS. R. WILLIAMSON.

42, Stibbington-street, London, N.W.
25th January.

PUBLICATIONS RECEIVED.

Sewer Gas and Health. By H. Alfred Roechling, C.E. 5s. Biggs and Co.

Stable Sanitation and Construction. By T. E. Coleman, F.S.I. E. and F. N. Spon.

Premature Burial: Fact or Fiction. By David Walsh, M.D., Edinburgh. Balliere, Tindall and Cox.

Journal of the Sanitary Institute. 2s. 6d.

Proceedings of the Institute of Sanitary Engineers.

The above acknowledgments do not necessarily preclude further notice. Any of the books mentioned may be obtained of the Sanitary Publishing Company, Ltd., 5, Fetter-lane, London, E.C.

Notes and Queries.

[Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C.]

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

951.—BACTERIA TANKS: MODE OF CONSTRUCTION.—"A. K. B." writes:—"I am building a house in the country, and am anxious to deal with the sewage therefrom on the bacteriological method. I propose to catch the solids and bury them, and purify the liquid by filters. There is a good fall on the land; and if the effluent can be made pure enough, I should like to pass it into some pools, so as to keep the water level up in summer. I prefer filters before the septic tank, as I fancy there are possibilities of sewer gas being generated extensively about the septic tank. I have read Mr. Dibdin's articles with great interest, but am troubled with the following difficulties:—(1) The bacteria will not work during frost. Must the filter, then, be built under cover, and perhaps warmed in winter? (2) How is the filter to be built so as to secure constant aëration? (3) Is the breeze to be put into the solid tank, with air-pipes running into it, starting above the top level? (4) If it is to be open all round, how is the sewage to be confined in it? (5) Is the rest the filter will get every night enough, or had I better have filters for alternate use?"

Answer.—We advise our correspondent to procure Dibdin's "Purification of Sewage and Water," price 21s., and Spinks' "House Drainage Manual," price 5s., both of which contain valuable chapters on the bacteria tank at Sutton, and which give full particulars of the mode of construction of bacteriological filters, the latter named book containing illustrations, which will be most useful to him. It will not be necessary to intercept the solids, except so far as they are retained by the screens, which are provided mainly to intercept paper. The solids may be dug into land in the same manner as applying ordinary manure. The effluent should be pure enough to discharge into pools, and if the filters are properly managed the effluent will not undergo putrefaction. It is incorrect to state that the filters will not work during frost. We understand that the Sutton filters are not affected by frost. The filter should not be covered, and warming is unnecessary and unpractical. It may be constructed with walls and floors of concrete or masonry, or, where the ground is stiff clay, the filters may be constructed without artificial walls. The aëration of the filters is secured by the alternate filling and emptying of the filter, and allowing it an interval of rest of two or more hours. We understand that the filters so successfully adopted at Sutton have not perforated walls. It is preferable to have the filters in duplicate.

952.—DRAIN OR SEWER: VESTING OF SAME.—"J. B." writes:—"Referring to your answer to Query No. 928 in your issue of January 14th, will not the passage shown in the sketch come under Sec. 150 of the Public Health Act, 1875, and the sewer be the property of the owners of the houses until such time as it is taken over by the Local Authority?"

Answer.—Unless a Local Authority, immediately after the completion of a new sewer in a private street, express by notice in writing to the owners their dissatisfaction with the construction of the sewer, they will be unable to divest themselves of the vesting of the sewer imposed by Sec. 13 of the Public Health Act, 1875, which prescribes that "All existing and future sewers within the district of a Local Authority, together with all buildings, works, materials, and things, belong thereto, &c., shall vest in and be under the control of such Local Authority." In a similar case Bonella *v.* Twickenham Local Board, 18 Q.B.D. 577; 56 L.T. (N.S.) 486, affirmed in Court of Appeal, 20 Q.B.D. 63; 52 J.P. 356, where a sewer had been laid in a street by private persons, and had vested in the Urban Authority, under Sec. 13 it was held that the Urban Authority could not require the owners to lay a new sewer when a new system of drainage had to be adopted. In Barrow-in-Furness (Mayor, &c., of) *v.* Dawson, decided on 4th December, 1890, Smith, J., held that it was a question of fact to be decided on the evidence whether an Urban Authority had expressed satisfaction with, or were, in fact, satisfied with the sewer as originally constructed; but he accepted the principle laid down in the Twickenham case that "if after the lapse of a reasonable time after the vesting of sewers in a Corporation, they had done nothing and expressed no view on the subject, it must be taken to be conclusive as a matter of fact that at the time the sewer was originally constructed they were satisfied with it for the purpose for which it was then used."

953.—PUBLIC HEALTH (SCOTLAND) ACT, 1897.—"A. B." writes:—"(1) Under this new Act policemen have to report nuisances. Where are they supplied with a copy of the Act or with the necessary instructions? (2) Where do Inspectors of Nuisances obtain copies of the Acts? Surely they are not expected to buy them?"

Answer.—(1) It is provided by Sec. 19 of the Act that it shall be the duty of every officer of a Local Authority, and of any constable or officer of police of the county or burgh, in accordance with the regulations of the Authority having control over him, to give information of any nuisance under the Act to the Local Authority, and it shall be the duty of the said Authority to make the said regulations. A constable of police will, therefore, act under the regulations furnished him by his Authority. It will not be necessary for him to be supplied with a copy of the Act. (2) Inspectors of Nuisances will obtain a copy of the Act at the cost of the Local Authority.

954.—REFUSE DESTRUCTORS: NUISANCES FROM.—"G. S." writes:—"(1) Would it be desirable to allow the erection of destructors for destroying the excreta and household refuse in close proximity to the public abattoirs or in the vicinity of dwellings? (2) Would such works be likely to create any nuisance, or be a menace to the health of those living close by? (3) Would it not be advisable to have all such works away from centres of population, and if so, why? (4) Can you give me any reference as to the effect of dust destructors on the Public Health?"

Answer.—(1) It is inadvisable to select a site for the erection of a refuse destructor adjacent to public abattoirs, and in closely populated districts, except when no other site is procurable. (2) There is no proof of refuse destructors creating nuisances injurious to health where such destructors have been properly designed and carried out. From some destructors there is, however, a nuisance from fine dust passing up the chimney shaft and being deposited in the immediate neighbourhood of the destructor, but the most serious objection is that caused by the carting of refuse in the streets converging to the refuse destructor. (3) For the reasons stated in (2) it is always to be preferred that destructors be erected away from populous districts if sites can be procured. (4) We are not aware that any statistics are procurable to show that destructors have been prejudicial to the health of the neighbourhood in which they are placed.

955.—WORK ORDERED BY SANITARY INSPECTOR ON PRIVATE PREMISES.—"Sanitas" writes:—"(1) Has an Inspector of Nuisances any power to order work to be carried out by a workman, employed by the landlord, without proper legal notice being first served by the

Sanitary Authority? If so, under what Act and section? (2) Would the landlord be within his legal right in refusing to pay for work which was not ordered to be carried out by him? (3) Could you tell me if there has been any similar case tried before a Court?"

Answer.—(1) An Inspector of Nuisances has not any statutory power to enforce, except after reporting to his Authority, the carrying out of sanitary works. The Local Authority are the judges of the sufficiency or otherwise, acting on the report of the Inspector of drainage and sanitary conveniences, &c., and generally it is necessary that the Sanitary Authority must serve a statutory notice on the person in default. We are inclined to the opinion that in this case the Sanitary Inspector pointed out to the workman what was necessary to be done, in which he was acting properly in the discharge of his duties, and no doubt in the best interests of the owner of the property. Such direction on the part of the Inspector would not involve him in any liability for payment. (2 and 3.) In a somewhat similar case, decided in the City of London Court (Clarke *v.* London, September 16th last), where a builder did certain work at premises in the City of London, belonging to the defendant, and where the order for the work in question was given by the Sanitary Inspector, the owner knowing nothing whatever of the matter, the learned judge made use of the following observations:—"If a Sanitary Inspector required work done, a builder was bound to do it. Under the Sanitary Acts a landlord was liable for such work, although he did not give any order." Mr. Gathercole, the Sanitary Inspector, said the work was done on his verbal order. The learned Judge gave judgment for the amount claimed, with costs. Although the above case was one under the Public Health (London) Act, 1891, and too much reliance must not be placed upon it, it may, however, be helpful to our correspondent.

956.—Parochial Charities: Publication of Accounts.—"L. W. M." writes:—"A charity (not belonging to a church) is now distributed by trustees, appointed according to a scheme formulated by Charity Commissioners. Should the accounts be brought before the Parish (Council) meeting according to the Act, or is it not necessary?"

Answer.—Sec. 14 (Sub-section 6) of the Local Government Act, 1894, requires that the accounts of all parochial charities (not being ecclesiastical charities) shall be laid annually before the Parish Meeting of any parish affected thereby, and the Charitable Trusts Amendment Act, 1855, shall apply as regards transmitting accounts, &c., annually to the Charity Commissioners, and a copy thereof is to be delivered within fourteen days to the chairman of the Parish Meeting, and the names of beneficiaries of dole charities shall be published annually in such form as the Parish Council (or where there is no Parish Council, the Parish Meeting) shall think fit. In the case mentioned by our correspondent the accounts should be required to be submitted in conformity with the Act. We may also point out that the Parish Council appear to have power to appoint additional members on the governing body of the parochial charity, if it does not already include persons elected by the ratepayers, and of such number as may be sanctioned by the Charity Commissioners.

957.—Steam Disinfector Discolouring Linen: Remedy.—"E. R." writes:—"Lately a Reck's disinfector has been fixed in our district. We are troubled with the discoloration of the articles disinfected, which on being removed have a dirty, spotted appearance, and no amount of washing will cleanse them. Can you suggest a remedy? I may say that everything in connection with the disinfector is made of iron, and that the water supply is of a very soft nature."

Answer.—The discoloration referred to is, doubtless, oxide of iron or rust, which is so readily formed when the interior of the chamber is alternately exposed to air and moisture. A very simple remedy is to apply a coating of freshly-slaked lime to the whole interior, having made it previously thoroughly dry. A wash of Portland cement will also be similarly found effective. Allow the coat to dry before the apparatus is again used. Renew the wash as occasion requires.

958.—History of Sanitary Administration.—"Clerk" writes:—"Can you refer me to any publication containing a history of sanitary administration, *i.e.*, dealing with the effects in particular localities of the carrying out of sanitary improvements upon population, the public health, the death-rate, &c.?"

Answer.—We are of opinion that our correspondent will find the Annual Reports of the Medical Officer of the Local Government Board of considerable assistance, and superior to any other publication for his purpose. In the ninth report of the Medical Officer of the Privy Council (fo. 866) will be found an excellent table of the effect of sanitary works on the general annual death-rate, and on the mortality from typhoid fever and phthisis in a large number of towns in the country. The reports are published by Messrs. Eyre and Spottiswoode.

Vacancies.

Clerk of Works (Teignmouth, February 9th).—For the Urban District Council. Mr. C. Jones, surveyor and engineer to the Council, Town Hall, Teignmouth.

Electrical Engineer (Barrow-in-Furness, February 8th).—For the Corporation. Commencing salary £200 per annum. Chairman of the Electric Lighting Committee, Town Hall, Barrow-in-Furness.

Engineer, &c. Bury (Lancs.), February 7th.—For the Gas Committee. Salary to commence at £350 per annum. Mr. John Haslam, town clerk, Corporation Offices, Bury.

Engineer and Surveyor (Derby, February 12th).—For the Corporation. Salary £600 per annum, increasing by £50 per annum to £750. Mr. H. F. Gadsby, town clerk, Town Hall, Derby.

Engineer's Assistant (London, S.E., February 12th).—For the Baths and Wash-houses Committee of the Vestry of St. Mary, Newington. Salary £2 per week. Application forms supplied by Mr. L. J. Dunham, clerk, Vestry Hall, Walworth-road, S.E.

Sewage Works Manager (Haslingden, February 7th). — For the Haslingden, Rawtenstall, and Bacup Outfall Sewerage Board. Mr. R. W. Bugler, clerk, West View, Haslingden.

Surveyor (London, E.C., February 7th).—For the Worshipful Company of Ironmongers. Clerk, Ironmongers' Hall, Fenchurch-street, E.C.

Water Inspector (Basingstoke, February 12th).—For the Council. Wages £1 10s. per week. Mr. George Fitton, borough surveyor and waterworks manager, Town Hall, Basingstoke.

Sanitary Inspector (London, S.E., February 15th).—For the Vestry of St. Mary, Newington, London. The salary will commence at £110 per annum, with an annual increment of £5 to a maximum of £150. Application forms supplied by Mr. L. J. Dunham, vestry clerk, Vestry Hall, Walworth, S.E.

Sanitary Inspector (London, S.E., February 8th).—For the Lewisham Board of Works. Salary, £100 per annum, with an annual increase of £10 to £150. Mr. Edw. Wright, clerk, Lewisham Town Hall, Catford, S.E.

Sanitary Inspectors (London, S.W., February 9th).—For the Vestry of St. Mary, Battersea. No. 1 District, salary £150 per annum; No. 2, £101; No. 3, £141; No. 4, £150; No. 5, £101; No. 6, £150; No. 7, £150; No. 8, £140. Mr. W. Marcus Wilkins, vestry clerk, Municipal Buildings, Lavender Hill, S.W.

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HOUGHTON-LE-SPRING.—February 5th.—Removal of Refuse.—Mr. John Geo. Baty, clerk, District Council Offices, Houghton-le-Spring

LONDON, S.W.—February 9th.—Reconstruction of Drainage, &c.—Mr. T. W. Aldwincle, 1, Victoria-street, Westminster.

SWANSEA.—February 7th.—Sewer.—Mr. R. H. Wyrill, Guildhall, Swansea.

WOLSTANTON (STAFFS).—February 7th.—Scavenging.—Mr. Jas. Beech, Inspector, Brownhills, Tunstall.

ABERDEEN.—February 8th.—Sewer, &c.—Mr. William Dyack, Burgh Surveyor.

COTEHILL (CARLISLE).—February 8th.—Sewer Pipe.—Mr. W. Crosthwaite, Sanitary Inspector, Stanwix.

ROCHDALE.—February 8th.—Sewer Work.—Clover Croft Works, Hamer-lane, Rochdale.

BIRKENHEAD.—February 14th.—Removal of Night-soil, &c.—Chief Inspector of Nuisances, Town Hall, Hamilton-square.

CHEADLE (STAFFS).—February 16th.—Sewer, &c.—Mr. F. T. Inskip, Surveyor, Brook House, Cheadle.

TIPPERARY.—February 14th.—Sanitary Works.—Mr. Joseph Gubbins, clerk, Workhouse, Tipperary.

BURNLEY.—February 16th.—Mr. S. Edmondson, district surveyor, 18, Nicholas-street, Burnley.

ASTON MANOR (BIRMINGHAM).—February 17th.—Sewer.—Mr. H. Richardson, A.M.I.C.E., Engineer's Offices, Council House, Aston Manor.

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THE

Sanitary Record,

FEBRUARY 11, 1898.

SMALL-POX IN THE GERMAN ARMY AND AMONG THE FRENCH PRISONERS IN 1870–71.

By EDWARD F. WILLOUGHBY, M.D. (London).

To those who know anything of the perfection of the military organisation of Germany the statement that the mortality from small-pox had not been recorded, or the notion that the machinery had been dislocated by the war, would be, on the face of it, incredible, even when supported by the answer of Lord Granville in the House of Lords. But Lord Granville was in office from 1880 to 1885, and at that time he was correct in stating that the statistics in question had not been published. It was in 1886 that the medical history of the war appeared in seven stout quarto volumes, a colossal undertaking such as no other country could have produced. Besides a full description of the organisation of the service, construction of hospitals, methods of performing surgical operations, with analyses of results, dietaries, &c.; every case of illness or of wounds admitted to the hospitals in the field or at home from every separate batallion, or other unit of that vast host of over a million men, as well as from some 375,000 French prisoners, is recorded and tabulated under several heads, with full discussions of the etiology, pathology, complications, treatment, and, in a large proportion of the fatal cases, of the *post mortem* appearances; constituting the work an encyclopædia of military medicine and surgery. And yet Dr. Hadwen, Mr. Tebb, and the rest, twelve years after their publication, have the impudence to deny the existence of these reports, and to accuse those who, like myself, have seen and read them, of wilful deception!

However, to be scrupulously accurate, I will confess that I, writing from memory of what was common knowledge prior to the authoritative publication of the official reports, have in my books and contributions to the journals, under-estimated the number of deaths from small-pox in the German army in the field. They were not 263 as I have stated, but 278. The 23,469 deaths in the French army during the war I gave on the authority of Dr. Chenu, chief of the Medical Department of that army, who, of all men, ought to know. The *average strength* of the German armies actively engaged was 788,213, but if one add to this number the drafts continually joining to fill the places of the killed and wounded, and of those who died, or were invalided by disease, one million will be no excessive estimate of the total. Among these there were 4835 cases and 278 deaths.

The total number of French prisoners interned in Germany was 374 995, though, as they were brought in successive batches after the great battles during August, 1870, and the surrenders at Strassburg, Sedan, and Metz, the *average* number throughout the entire period was 262,496. Among these there were 14,178 cases with 1963 deaths. These figures, however, must not be taken as indicating the relative susceptibility of German and French soldiers, even under the regulations then in force in each army, for the conditions of the latter were being continually changed. The prisoners were distributed among some twenty or thirty garrison towns, the numbers quartered in each ranging from 1000 to 15,000 according to the accommodation available. Whenever cases of small-pox appeared the rest of the detachment were vaccinated, if need were, as with the Turcos, by force, and the outbreak promptly arrested. Each fresh arrival of prisoners bringing with them the seeds of another outbreak, the work of suppression had to be resumed.

I must reserve the statistics of the French Army to a subsequent article.

THE GERMAN VACCINATION ACT OF 1874.

Another equally false allegation of the anti-vaccinationists is that vaccination and re-vaccination were as strictly enforced in Germany before the Franco-German war as they have been since; that it was the law already in force in Prussia, which she, as the "predominant partner," imposed on the

lesser States, and that the change, if any, in the practice has been towards greater laxity, vaccination having previously been required within the first year, but now before the end of the year of grace following that in which the child was born, *i.e.*, within thirteen to twenty-three months, according as the birth occurred in January or December. Except the last, these assertions are absolutely false. I have before me the Act itself, and Jacobi and Guttstadt's annotated edition, with notices of the local laws that it superseded, and excerpts from the speeches delivered during the progress of the Bill through Parliament. In the introduction they thus describe the position:—

"Vaccination was already a subject of legislative concern in most of the federated States. Legislation had in the great majority expressed itself in favour of compulsory vaccination restricted to the first year of life. Thus in Bavaria, Baden, Hesse, the Grand Duchy of Saxony (Coburg-Gotha), Oldenburg, Brunswick, Sax-Meiningen, Anhalt, Schwarzburg-Rudolstadt, Hamburg, and Alsace-Loraine; in some indeed since the beginning of the century, the single vaccination of infants was the sole duty enjoined on the Local Authorities. Recently a few of these States, as Sax-Meiningen and Anhalt, had made provision for the re-vaccination of children at some later age. In the kingdom of Saxony and in Prussia, the legislature maintained a somewhat different position. In the former State compulsion was wholly foreign to the legislation, and the same was the case in Prussia, at any rate prior to the year 1866, for in the provinces subsequently annexed, viz., Hanover, Schleswig-Holstein, and Hess-Nassau, legal compulsion existed as regards the vaccination of infants, and in Nassau to a limited extent even of re-vaccination. In the kingdom of Saxony, however, as in the older provinces of Prussia, the Government had long endeavoured, and not without success, to introduce among the mass of the people the general practice of vaccination. These diversities in the state of the law, together with the scant attention that had been devoted to the statistics of vaccination, seriously impaired the practical value of the evidence laid before the Imperial Parliament. On close examination so many gaps and such considerable differences were found that all attempts at drawing definite conclusions had to be abandoned."

I have quoted Dr. Guttstadt thus fully to show the gross untruthfulness of the assertion that the Imperial law of 1874 was but the extension to the rest of the empire of that which already obtained in Prussia, a country which Professor Körösi, of Budapesth, ranked with Austria, France, and Holland, as one of the worst vaccinated at that time; England, Scotland, Sweden, and Bavaria, being in his opinion among the best; and Dr. Voigt, of Hamburg, stated that in that city, the only compulsion being exerted by the School Authorities, vaccination was generally deferred until the sixth year, when their attendance at school rendered it obligatory.

Except in Frankfort, re-vaccination, other than that of army recruits, was as wholly optional and as generally neglected as in this country, and there was practically no compulsion in respect of the vaccination of infants. By the law of 1874, vaccination within the second year, and re-vaccination at the completion of the twelfth (unless the child have had small-pox, or been already successfully re-vaccinated within the five years immediately preceding) are enforced under penalties of 20 m. (= shillings) for the first, and to 40 m. or three days' imprisonment for repeated defiance of the law. The proportion of successful evasions of primary vaccination by removal or otherwise than owing to medical certificates of unfitness, is less than 10 per cent. for the whole empire, and quite insignificant in the large towns and populous districts, the percentage evading re-vaccination is 0·6 without and 3·0 with such certificates. These facts are a sufficient answer to the question why we appeal to the evidence from Germany since 1874, and why our opponents refuse to face it. In 1870—2 small-pox ravaged the whole of Europe, and having practically exhausted the susceptible material, all countries alike enjoyed a respite for a few years. In 1874 Germany turned over a new leaf, adopting compulsory re-vaccination of all children as they entered on their thirteenth year, while the other nations continued much as they were before, and with the result that while everywhere else epidemics have recurred with their accustomed regularity, there have been none in Germany, while even isolated cases and small local outbreaks have become rarer year by year, as the proportion of the population who, by having

Deaths from Small-pox per 100,000 *Population in*

Year ...	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883
Berlin ..	22	632	138	11	2·4	5·1	1·8	0·4	0·7	0·7	0·8	4·7	0·4	0·3*
Hamburg	25	1075	95	0·8	0·5	0·0	1·8	1·2	0·2	0·0	0·0	2·2	0·4	0·0*
Breslau ...	13	356	282	13	0·8	0·0	0·0	0·7	1·5	0·3	0·7	1·1	3·2	8·3*
Munich ...	0·0	88	61	2·9	1·0	0·0	0·5	0·0	0·9	0·0	0·0	1·0	2·9	0·0*
Dresden ...	9·0	360	85	13	4·3	2·5	0·5	0·9	0·0	1·8	3·6	2·6	1·3	0·8*
London ...	30	242	53	3·5	1·6	1·3	20	70	38	12	12	61	11	3·4
Paris ...	?	?	5·5	0·9	2·4	13	20	6·8	4·4	45	108	49	29	20
Vienna ...	46	74	536	228	135	113	167	84	75	46	73	123	108	9·6
Petersburg			No	record	ds				144	142	21	28	77	46
Prague ...	?	15	?	?	30	11	78	395	86	84	290	64	57	224

* Since 1884 many years have passed without a single death.

Before 1874 the mortality had long been higher in Prussia than in Austria, but since that date it has risen in Austria to a higher figure than previously, while in Germany it continues to decrease, and the great towns enjoy almost entire exemption.

passed their thirteenth year when the Act came in force, escaped its essential provision, that of re-vaccination, is growing less; and even these cases are invariably the consequence of infection introduced from neighbouring countries.

The sanitation hypothesis is a hollow sham. I grant that the poorer classes in Italy are dirty, ill-feed, and worse housed, but there is little difference between the Germans and ourselves. The fallacy of the argument is, however, palpable when one compares the eastern provinces of Prussia, the population of which is not German but Polish, poor, ignorant, and dirty, and like the peasantry of the West of Ireland in habits and diet, enjoying, but for occasional introduction of infection from over the Russian frontier, an exemption equal to that of the other districts, with the Dutch, whose cleanliness and thrift are proverbial, but who with vaccination perfectly optional and generally neglected suffer from small-pox in the proportion, compared with Germany, of 620·1 !! Vaccination would have been compulsory in France had the Bill introduced in 1881 by Dr. de Lionville become law, but it did not pass beyond the first reading, and the subject was dropped, save for the issue of a circular on the advantages of vaccination, which was described as "the duty of every good citizen."

As to the statement that the French army was as well vaccinated as the German, it is true that since 1857 all young soldiers had, according to Dr. Legouest, been vaccinated, but this regulation did not extend to the Garde Mobile, which constituted so large a part of the army in the war of 1870—71, and the quality of the vaccinations performed may be judged from the fact that ten years later (*l'Hygiène en France par les Drs. Napias et Martin*, 1882) the authorities congratulated themselves on the great improvement effected since the war, as shown in the high proportion of successful vaccinations, which had reached 30 or 35 per cent. What could it have been before? A German army surgeon who failed in two out of every three cases of men who had not been vaccinated since infancy, would be curtly informed that his Majesty could dispense with his services, since not more than one failure in ten could be allowed. So far, then, from every French soldier being vaccinated, the truth is that only one in three is so now even in the line; and that at the time of the great war the proportion was much less, while of the Garde Mobile, especially the Breton regiments, which furnished some of the best troops engaged, the great majority were wholly unvaccinated. Between 1875 and 1879 there were, according to M. Marveau (*Jour. d'Hyg.*, February 21st, 1884), 4273 cases of small-pox in the French army with 363 deaths, equal to 5 per cent.; while in the German there were from 1873 to 1878 only eighty-five cases with no deaths. In 1879 an outbreak occurred involving seventy-three cases, not one of which was fatal. The explanation is, that while nearly every German soldier was re-vaccinated, only one in the three of the French soldiers was; for an unsuccessful vaccination is no vaccination at all, and leaves the individual precisely where he was before.

In this article I have exposed the falsity of certain statements which the anti-vaccinators persistently advance: (1) That the statistics of small-pox in the German army during the war exist only in the imagination of the advocates of vaccination; (2) that the French army was, or is, as thoroughly vaccinated as the German; and (3) that vaccination was as universally and strictly enforced in Prussia, if not throughout Germany, before the war, as since, and that the Act of the Imperial Parliament of 1874 was but the application of the Prussian law to the whole empire. These are not questions of inference, but of fact, which may be, and which I have determined by reference to Statute-books, and the official statistical reports of the respective countries, so that the repetition of these falsehoods will be wholly inexcusable.

Notes.

THE outstanding event in London last week was the speech of Lord Salisbury on the problems of the future government of London. The importance of the question in the minds of the Government has already been indicated in the speech of the Prime Minister at the Albert Hall some two months ago; and the position it occupies in the eyes of the people of London was sufficiently evinced by the size and the influential character of the deputation that waited on him and the Duke of Devonshire at the Foreign-office on the 2nd inst. The delegates present represented no less than twenty-two different parishes, with a total population of 2,600,413, and a rateable value of £20,638,260. Mr. Wheeler, Q.C., who introduced the deputation, pointed out how the population represented was equal to that of Liverpool, Manchester, Birmingham, Leeds, Sheffield, and Bristol combined, and the rateable value exceeded that of all those great towns by about 50 per cent. Backed by such a mass of popular opinion, which has been steadily growing in strength for the last two years, the views of the deputation were bound to carry the greatest weight.

A WIDESPREAD impression has prevailed ever since the date of Lord Salisbury's Albert Hall speech that the Bill that the Government propose to bring in will practically destroy the County Council, which was their own creation in 1888. The deputation made it very clear that they had no such aim, and Lord Salisbury in a few sentences brushed aside the very suggestion. The desire of the Government, on the contrary, is to increase the usefulness and the efficiency of that body by reducing the sphere of its labours, which is already too great. Many of the powers of the County Council may with advantage be transferred to the smaller municipalities to be created within its area. But it is fully recognised that many of its powers cannot be so transferred, but must remain as they are at present. The control of the Fire Brigade, main drainage, bridges, &c., must be left with the great central body. Indeed, as Lord Salisbury said, so far from the power or the dignity of the London County Council being minimised, he owned that, owing to the physical conditions of the metropolis, it was necessary that the Council should possess larger powers than other County Councils did.

WHEN it comes to be a question of what powers are to be devolved and how the rates will be

affected, problems of some difficulty at once arise. The Duke of Devonshire, while acknowledging his entire sympathy with the objects of the movement, looked at the subject from a practical point of view, and pointed out to his hearers many of the difficulties with which it is beset. He will have charge of the Bill when it is introduced, and it was therefore inevitable that the practical details of the measure and the shape that it will have to take should occupy the greater share of his attention. In the Privy Council-office, where municipal charters are issued, he has had considerable experience of the difficulties that attend the readjustment of powers even in the case of provincial boroughs; and such difficulties he could foresee would be as nothing to those which would arise in the case of the readjustment of powers in the metropolis.

One note struck by Lord Salisbury deserves special attention, and that is the growing tendency for the London County Council to be dominated by party politics, against which he uttered a word of warning. His desire was, he said, that it and all other County Councils should be as little concerned with general politics as possible, but should devote their whole attention and power to the adequate performance of their duties. The wonder is that a view which is so plainly dictated by common sense should require to be enunciated at all. It is unhappily too true that, governed as London is at present, a singular degree of apathy pervades the people regarding all municipal questions, and the only possibility of giving life and interest to the elections is by importing the heated air of politics into them. The view of the Government is that a remedy to this apathy will be found by the adoption of a system of devolution such as obtains in France, whereby not only will municipal efficiency be increased, but the affairs of each municipality will be brought more closely under the observation of the citizens, and municipal government will become more a matter of constant discussion and interest, and that will lead to a more healthy and vigorous condition of public life.

The first annual meeting of the Council of the Prince of Wales's Hospital Fund was held at Marlborough House last week, under the chairmanship of His Royal Highness. The Report of the Executive Committee, showing how the money collected for last year had been distributed, was adopted, and various resolutions were subsequently moved and carried. Of these the most important was one proposing the appointment of a Committee of Inquiry, "to visit personally and examine the various hospitals of the metropolis, with a view to ascertaining their present condition, needs, and merits, for the allocation of the funds received during 1898." The object of such a Committee is, of course, to secure that the assistance of the Fund is given to deserving hospitals only, for which alone the Fund was designed: and for that purpose careful inquiries, in many cases necessarily of a delicate nature, are essential, the results of the inquiries being in all cases kept strictly private.

The progress of the Local Government Board inquiry into the Maidstone typhoid epidemic is, as might have been expected, arousing a great deal of public interest. The inquiry is being conducted by Mr. James Stewart Davy, Dr. Theodore Thomson, and Mr. George Waller Willcocks, and a considerable array of counsel is engaged. The evidence had last week included that of Mr. Adams, Medical Officer for the borough, who said that he thought there was conclusive evidence that the Farleigh water was the cause of the epidemic, for 107 of the Barming Asylum patients were stricken with typhoid, and none but Farleigh water was used at that institution. It was impossible, in Mr. Adams' opinion, that the Maidstone drains should have caused the outbreak at the asylum, as they did not extend to there. He had never heard of a case where a typhoid epidemic was caused by the insanitary condition of a town, his experience being that the usual mode of propagating typhoid in an epidemic form was either by water or milk, and he was satisfied that the Maidstone outbreak was not caused by milk. He added that he had proved that the Farleigh water had poisoned over 1900 persons, nearly the whole of whom had drunk that water.

Dr. Washbourn, of Guy's Hospital, also confirmed his previous bacteriological reports to the Town Council that there was positive evidence of animal pollution in the samples of Farleigh water taken on 18th September. He did not actually find the typhoid bacillus, but pointed out that it was very rare that such discoveries were made. On the other hand, Dr. Sims Woodhead, lecturer on bacteriology at the Royal College of Physicians and Surgeons, who was called as a witness for the Water Company, said that he had analysed various samples of Farleigh water taken on 5th November, but had failed to find any traces whatever of typhoid or animal pollution. He had advised the company to sterilise the water mains merely as a precautionary measure, and to restore confidence among the townspeople. Dr. Tew, Medical Officer of Health for the West Kent Combination of Rural District Councils, gave evidence for the Maidstone Rural District Council, and stated it as his distinct opinion that the fever was conveyed by the water and not by the drainage. He said that a bacteriological examination he made of a sample of the Farleigh water taken on 22nd September disclosed the presence of the *bacillus coli*, though he could not trace the typhoid bacillus. The water was also polluted with fœcal matter. He added that the results of his examination had been confirmed by Dr. Foulerton's report.

The inquest on the body of Mrs. Jones, the head nurse at Hatton County Lunatic Asylum, who died recently under mysterious circumstances, as reported in our "Notes" last week, was opened on the 29th ult. Dr. Miller, the Medical Superintendent of the Asylum, adhered to the opinion he had previously expressed, that the epidemic which had excited so much public attention, and from which the deceased had died, was merely a form of influenza, and had nothing to do with poisoning, as has been alleged. In Mrs. Jones' case it had been aggravated by chest and kidney complaints. The suspicion which has been aroused in the neighbourhood has, however, been by no means allayed, and the Coroner has deemed it necessary

to adjourn the inquiry until the 25th inst. for an analysis of the contents of the stomach of the deceased. That test may not be quite infallible, but it is quite probable that it will determine the true character of the outbreak.

A VERY painful scandal has arisen in connection with Darenth Lunatic Asylum. One of the women inmates of that institution became pregnant and died during her confinement some months ago, under circumstances that called for the strictest investigation. It was the duty of Dr. White, the medical superintendent of the asylum, to report the matter officially to the Asylum Committee; but, instead of doing so, he merely reported it to the Chairman of the Committee, leaving it in his hands. The chairman called a special meeting, and he and the clerk were directed to examine into the case. No report of the case was made by the doctor to the proper authorities until he recorded the death, and no *post mortem* examination appears to have been made, though the rules of the Asylum required this to be done. It was no doubt an error of judgment on Dr. White's part, but it was also a grave dereliction of duty; and the Metropolitan Asylums Board has marked its sense of the gravity of the omission by calling upon Dr. White to resign forthwith. Considering that he has been Medical Officer at Darenth for sixteen years, it seems an extreme course to adopt, but the Board felt that if they were to pass over such failures in the discharge of duty on the part of their officers, the responsibility of the members of the Asylums Board would be rendered quite intolerable, for public opinion is extremely sensitive on such matters as the regulation of our asylums. The recommendation was carried by a very large majority, as was also a resolution censuring the Darenth Committee for failure in the discharge of the duty entrusted to them.

VERY distressing accounts are to hand last week of the spread of the plague in Bombay. The death-rate, which on 20th January was 95·29, rose during the following week to the appalling figure of 108·7 per 1000, the normal rate being 45·37. The exodus is increasing, and is reaching such a pitch that the Government have felt themselves compelled to erect quarantine barriers everywhere in order to check it. The anxious desire of the Authorities is to prevent the flight of the panic-stricken natives, carrying with them the germs of the disease all over Western India. Fresh detachments of troops have been called out on plague duty, both to draw the sanitary cordon closer round the afflicted city and to assist in the cleansing and demolition of infected premises. Lord Sandhurst, the Governor, fears that the plague will increase rapidly within two or three weeks' time, in spite of all these precautions, and that penning up of the large population is likely to develope a panic; and so he has issued an order calling upon affected persons to remove themselves and their families to a camp across the harbour, on the group of islands including Hog and Elephanta Islands.

THE anxieties of the Government have been added to by a recrudescence of the plague riots. The panic caused by the spread of the epidemic, and the unreasoning aversion to the sanitary regulations for suppressing the infection, have roused popular fanaticism to such a dangerous pitch that serious riots have broken out in several places. At Nasik the mob broke into the buildings connected with the Medical Administration, attacked the officials with ruthless fury, and murdered the doctor in charge. They also wrecked all the sanitary sheds, demolished the Post-office, and cut all the telegraph wires, in order to prevent news of the disturbance from spreading. It is feared that similar riots may break out any day in Bombay itself. It is a dreadful state of affairs, and the task before the Government is one which will call for the utmost coolness and judgment. At present they are doing all that is humanly possible to stay the ravages of the disease; but in spite of their utmost efforts, they seem unable to cope with it.

NOTES ON

PRACTICAL SANITARY SCIENCE.

BY WILLIAM H. MAXWELL.

Assistant Engineer and Surveyor, Leyton Urban District Council, Author of "Drainage Work and Sanitary Fittings," "Ventilation, Heating, and Lighting," &c., Certificates of the Association of Municipal and County Engineers, and Sanitary Institute.

No. 48.—REFUSE DESTRUCTORS.

(Continued from page 112.)

Mr. B. D. Healey, in 1894, patented a new type of furnace[126] with boiler, and has very recently taken out a further patent for "Improvements in refuse furnaces and steam boilers, and setting boilers in connection therewith."[127] These latter improvements relate to the type of furnace and boiler referred to, and are illustrated in Fig. 12, of which the following is the description:—

Below the ashpit of the furnace is a tunnel for wagons, which receive the fine ashes from the fire-grate. At the back of the ashpit is the blast flue, in which is the main shaft with eccentrics for driving the cams of mechanical grates when such are used.

The furnace arch has two sets of ports for passing the gases into the flue, which collects the gases from several furnaces. Either the dampers of the front ports, or of the back ports may be fully open, or each may be partly open to suit the requirements of the furnace.

In the arch of the flue are openings through which the heated gases pass to the water-tube boilers, which are set over the furnaces and clinkering floor, or at the ends of a rank of furnaces, as may be most convenient to users.

The heated gases pass over a bridge, and downwards to the flue outlets, which are connected to the main chimney flue, and the velocity of the current passing thereto is regulated by a damper in each outlet.

The boiler may have one water drum at each end, but it is preferable to have sectional headers which take two tiers of water tubes each, as shown in the accompanying figures. The ascension pipes pass upwards to about 3in. above the

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126 Patent No. 12,179, A.D. 1894.
127 Specification patent No. 14,698, A.D. 1896.

water level of the steam drum, and the downflow or siphon limb tubes start about 3in. below the water level of the steam drum.

Instead of making the downflow tubes as described above, a dam may be put in water space of steam drum to keep back the mud and deposit, and instead of the ascension pipes extending to above the water level of steam drum, another dam may be put to about 3in. above the water level, and at such distance from the front end of the steam drum as will allow of the ascension pipes delivering their water and steam into the separator, which is formed by the latter-named dam.

The upper header has two connecting tubes for downflow of water from the steam drum, and the middle and lower headers have two ∩ connections each, or they may have two separate connections each to the steam drum, arranged in a similar way to those at the front of headers. All the tubes connecting the middle and lower headers with water space of the steam drum are provided with two universal joints for security and handiness of fixing.

The headers are by preference all made of the section indicated in Fig. 12 for front headers, which form a vertical face when set up as shown, but they may also be of the rectangular form as intended for ack headers. The usual pockets on the steam drum for receiving the tubes which connect with the headers are not required, but in place thereof single or double seats are attached to the drum and the tubes are expanded into them.

The inclination of the steam generating tubes between the lower headers and the upper headers does not require to be greater than 1 in 8, and should not be less than 1 in 12.

There is a greater number of tubes in the width of the setting than there is in the height, and this system is adopted whether the boiler is made larger or smaller than the one illustrated, so that in every case a maximum area of flue space is obtained, and a minimum rate of velocity of the gases without retarding the induced currents at the furnaces, and the latter may be worked with or without forced blast, or alternately with and without.

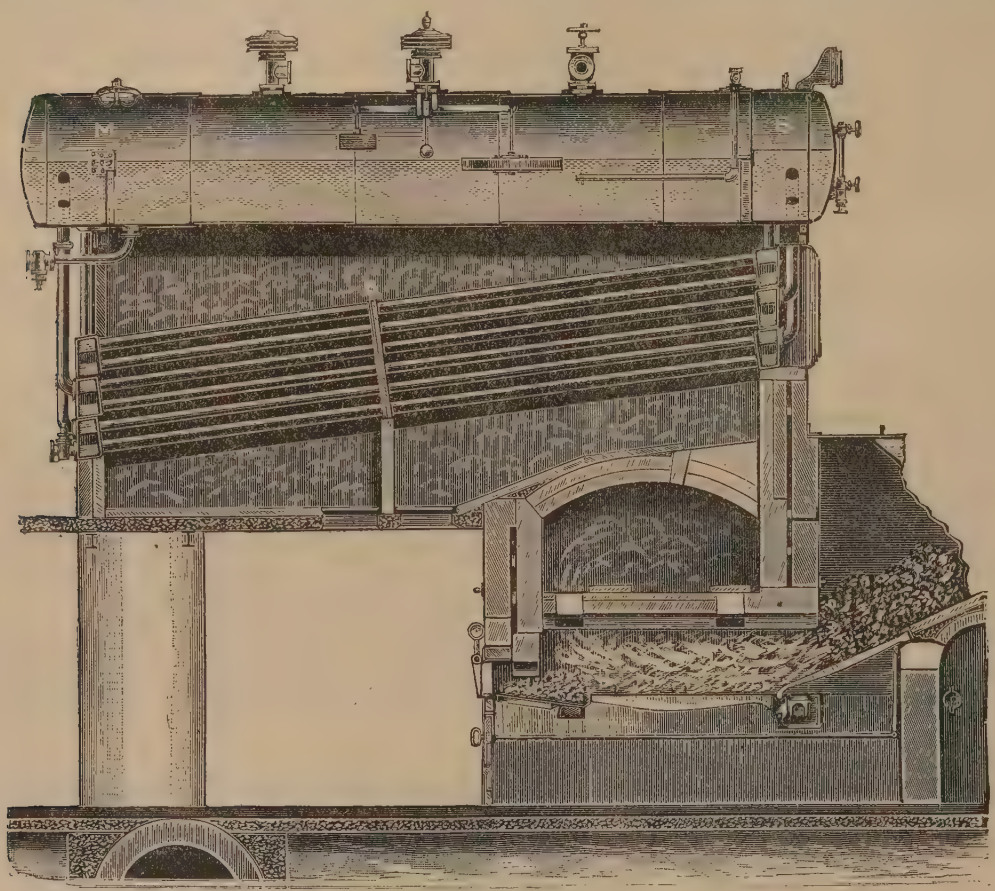


Fig. 12.—Healey's Refuse Furnace, showing boiler setting.

The charging entrance of the furnace springs at the same level as the furnace roof, and the crown of the arching over this entrance and furnace is finished evenly and level from end to end. The entrances for clearing out the dust from the boiler chambers are indicated in the figure. When a furnace is shut off for repairs, suitable close-fitting iron covers are laid over the gap in the ashpit bottom.

When the boilers, as shown and described, are

used for solid fuel firing the heated gases pass up and down twice before reaching the outlet flues. In every case the walls of the boiler setting are provided with the usual dust-cleaning slots and doors for steam jets to operate in.

The novel points claimed by Mr. Healey in connection with the above invention, are :—

1. Constructing refuse furnaces with arches over same, having a level line of springers, and with two sets of outlet ports, as shown.

2. Constructing such furnaces with a tunnel for ash wagons, large blast flue, and a collecting and distributing flue for heated gases.

3. Setting water-tube boilers over such furnaces, or at the ends of ranks of furnaces in the manner shown, or any mere modification thereof.

4. Building water-tube boilers with a greater number of tubes in the width than in the height of the setting.

5. The method of forming the water headers at the ends of the generating tubes of the boilers.

6. The method of connecting the ascension and downflow tubes to the steam drum and water headers.

7. Forming dams in the steam drum or projecting the ascension and downflow tubes thereinto.

8. The system of catching the mud and deposit by dams or their equivalent projecting tubes in the steam drum.

THE SANITATION OF DOMESTIC BUILDINGS.

By Frank Latham, C.E., M. San. Inst., &c., Assistant Surveyor, Borough of Margate.

CHAPTER III.

VENTILATION OF DRAINS.

The usual mode of ventilation of house drains is by means of metal pipes attached to the highest part of the drain and carried up in the open air to an elevated position, an inlet being provided at the lowest part of the drain. By this means relief is given to the pressure, and a current of fresh air is induced to course through the drain, removing offensive and impure odour.

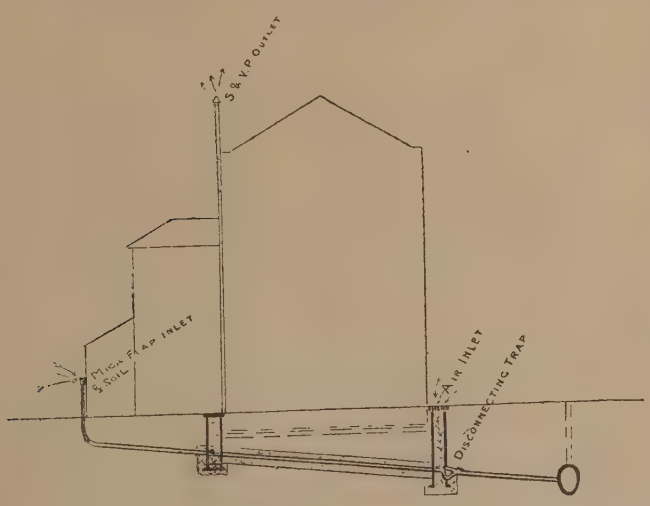


Fig. 22.

It is of the utmost importance that drains should be well ventilated, as the more open they are kept the less likely they are, not only of becoming foul, but for the air to find its way through any fracture or defect that may exist, into the house, it being easier for it to make its escape into the open air through an unobstructed ventilation opening.

The number of inadequate and unworkable methods of house drain ventilation that from time to time have come before the author's notice is considerable, to say nothing of the dummy ventilators which every now and then are discovered. In some cases every endeavour has been made to effect a good system, which on testing has been found a non-success.

To carry out a good and effectual mode of house ventilation requires something more than the sticking up of a pipe, or the results may be even more pernicious than the evils it is intended to prevent.

In ventilation of house drains there should be at least one inlet and one outlet pipe for the purpose of extraction. The inlet should be placed low down, and at the foot of the drain, the outlet being taken off the highest part and carried up some height, as by so doing the movement of the column of air, supposing the surrounding circumstances to be favourable, will be regular. The fresh air being admitted at the inlet, which on becoming warmed and therefore expanded and lightened, will rise up to the highest part of the drain and up the ventilator, the latter assisting its velocity by the current of air passing over its open end. The air inlet is generally fixed in conjunction with the disconnecting trap a contrivance by which the house drain is cut off from a direct communication with the sewer.

In cases where the closets are in the centre of the building, *i.e.*, between the main building and back addition, the principal outlet can be taken up at this point, but should the drain extend further on as is the rule, to pick up sink gullies and outside w.c., &c., another ventilation pipe should be carried off the extreme end, and terminate lower down, away from all openings, into the house. This will then act as an inlet for that part of the drain, and the one outlet will do service for the two inlets. (Fig. 22.)

Outlet ventilators can be in connection with the main soil pipes, which must be carried up full bore without any bend, if possible; terminating well above any windows, and away from any chimney or other openings. It is, however, preferable, for the purpose of ventilation, to have a separate outlet pipe in connection with the drains, as when the soil pipe is in use the ventilation is affected, and further, it is not always necessary or soil pipes to be as much as 4in. in diameter, but outlet ventilators should not be less than that size, and the dryer they are kept internally the better they work. The separate outlet and the soil pipe can, as a rule, be fixed side by side, and the latter, which must always have an open

end above where the top connection is made, instead of being carried up, can be turned into the side of the former—an expedient which would also apply to anti-syphonage pipes. No soil pipe should be trapped at the foot when disconnecting traps are used.

Where more than one closet discharges into a soil pipe, which, as before stated, should always be carried up full bore, and caused to ventilate above the roofs of the houses, the out-go pipe between trap and soil pipe of all closets should be connected to an anti-syphonage 2in. in diameter, and the same carried up full bore abreast of the soil pipe and terminated into

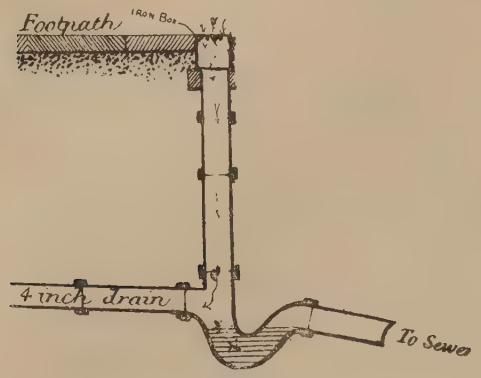


Fig. 23.

its side above the top fitting, unless other provision is made as before mentioned. The principal inlet ventilator at the foot of the drain should always be placed close to the disconnecting trap and on the house-drain side, a junction as a

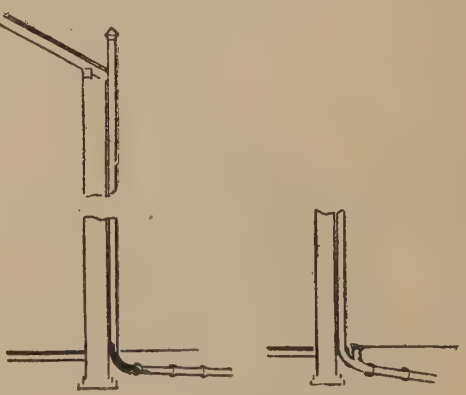
Fig. 24.

rule being provided on the trap for that purpose, which should be carried up in stoneware glazed pipes, properly jointed together, and terminating on the edge of the path, and the open end covered with an air inlet and dirt-box grating, which should be fixed level with the path. (Fig. 23.) This is the method adopted by the Local Government Board in their "Model Bye-laws," and is, in the author's opinion, having watched the results of some thousands of cases of its employment, very satisfactory.

In some cases of drainage, more particularly in connection with cesspools, the mica flap valve air-inlet ventilator is used. (Fig. 24.) This inlet is supposed to work automatically by the valve opening to let the fresh air pass in, and closing immediately any back-pressure takes place. It is well, however, not to trust too confidently upon this action being permanently maintained, as the mica valves are not always to be relied upon owing to their getting out of shape, and not properly closing, or in some way becoming damaged. Should the valve be in good order, the proper fixing of it also has much to do with its effective working. The valve box should be fixed a little inclined towards the front, till the flap is quite closed by its own weight. By so doing the valve will not remain open, when not admitting air, for the escape of any foul smells from the drain.

The outlet ends of ventilators should, in cases where there are no houses, chimneys, or trees at a greater height anywhere near that might produce a down-draught, be protected from birds building nests in them, by a wire cage; but should there be any danger of down-draughts a good open cowl, finished off to the pipe, with wire work, or other similar contrivance, is necessary to prevent the wind blowing down the outlet, and sending occasional puffs of air up the inlet.

Ventilation pipes should have as few bends as



Figs. 25 and 26.

possible, but in cases where these unfortunately cannot be avoided they should be long and slow, so as not to impede the air current, and to prevent as much as possible any rust, incrustation, or other foreign substance from finding a resting place in them. It is also important that ventilation pipes, when independent of a w.c., or flushing arrangement to keep them clean, should be provided with an inspection eye at the foot, to prevent their becoming stopped up with rust, &c., falling down the pipe, and lodging at the bottom. (Figs. 25 and 26.) It is preferable in such cases to use lead pipes to iron as they are not subject to rust or scale.

Traps under lavatory basins and scullery sinks should be ventilated by inserting 1½in. anti-syphonage pipe at the top of trap outlet, and for single wastes carrying it through an external wall, leaving the end open in the air. In the case of a range of basins, the trap under each basin should be vented in precisely the same manner as the latter and carried into one common 2in. anti-syphonage pipe, terminated in the external air. All ventilators should be connected above the water-line in the pipes; if not, when the drain is in use, the vent opening may be water sealed, and thereby rendered useless.

WHY THE SUPERFICIAL SOILS OF CITIES ARE UNSANITARY.

DR. ROBERT BARNES, who as long ago as 1855 was a health official for a part of London, treats, in a contribution to the *Scalpel*, of the dangerous properties of the superficial soil of cities, the careful future investigation of which will solve some of the mysteries of high civic mortalities. We agree with him that we do well to labour with the outstanding problems of water-supply, but as they will presently be mastered, the problems of the soil will become urgent, and, as they too are solved, life-saving will begin in good earnest. Dr. Barnes says :—"One of the most striking examples of the influence of soil, and soil governs water and air, is the generation of ague. Ague was at one time endemic in Shoreditch, but it has vanished. So we may reason that unhealthy sites may be made healthy by care, but it is not less true that sites, naturally the most salubrious, may by neglect become pestiferous and deadly. I showed that we were chiefly concerned with the soil to the depth of 30ft.

"Proceeding from the surface we had a bed of variable thickness, commonly called 'made earth.' It is chiefly an artificial stratum. The proportions of 'virgin soil' to that of common earth had been reduced to a very insignificant amount. The great bulk was made up of refuse of every kind. . . . This upper stratum so constituted had been further polluted, and its noxious qualities intensified, by innumerable perforations for cesspools, and constant saturation from defective sewers and drains, the poisonous emanations from gas pipes, and every conceivable abomination resulting from the off-scourings of a population of 25,000. This layer of foul stuff, or pest-stratum, as it may appropriately be called, varied in thickness from 1ft. or 2ft. to 16ft. or more. This description of the pest-stratum is a very important contribution to geology. This last stratum, the work of man, has to be cleared away. This done, geology reverts to its primeval natural purity. Another observation may be pardoned. If this pest-stratum, laden as it is with putrescent matter, could be kept dry, it would be comparatively harmless. Moisture is a necessary element for the evolution of its pestiferous properties. Hence good surface drainage is not less necessary than deep drainage.

"And we may see a happy illustration of this in the present condition of the city and the more perfect districts of London. The paving and other means for securing quick surface drainage not only lessen the emanation of foul air from the surface, and from the soil beneath, but they also promote the dryness of the air. The relative humidity of the air in London is often less than in the country. This is especially marked at night. There is little or no dew. The dry surface gives off no moisture for precipitation. And so we get in London the luxury of clear, dry, fresh air at night to a degree hardly known in many parts of the country. Doctors who have experience of night work have found this out. A practical lesson from this is : That windows may often be opened at night in London with benefit, when in the country, where grass is near, the practice is fraught with danger. I have had many proofs of this in country consultations.

"To secure this surface drainage and cleanliness to the greatest extent it is essential that the material for pavements be solid and impermeable to moisture. Flagstones and asphalt fulfil these conditions. Wood pavement, pleasant as it is in some respects, does not. It absorbs damp filth and gives off foul air and dust. The population actually living on the bosom of the Thames, whose every breath is a distillation from its water, is not especially liable to fever ; not so much so, indeed, as the population whose dwellings skirt the banks. And this littoral population, it must be borne in mind, is exposed not only to the malaria arising from the banks, but also to that same class of pernicious influences attached to bad sites and badly constructed houses, which are found alone sufficient to generate fever.

"Few of the seamen who filled the medical deck of the Dreadnought contracted their illness on the river under circumstances which can be connected with the state of the waters ; and of these few it will be found that the illness of most could be traced to cold, wet, exhaustion, bad food, drinking bad water, and over-crowding in the close ill-ventilated forecastles of unhealthy ships. Most erroneous assumptions still continue to guide the exertions of those who are most earnest in favour of the present scheme of what is called the dis-pollution of the Thames. I had studied the Gulf Stream as it flows in a distinct current across the Atlantic ; I had seen the Plata propelling its stream of fresh water unmingled many miles into the ocean ; I had traced the confluence of the Rhine and the Main, whose streams are coloured, one red, the other green, running on side by side, two rivers in one bed, and I concluded that the great sewage stream would hold its course, a concentration of pollution.

"Sir John Simon, in his admirable reports, expressed conclusions in harmony with the above, and with the evidence adduced in my observations on the Thames, read before the British Association at Dublin. In this memoir, based upon examinations of the Thames water, of which samples were taken weekly during a whole year, at high and low water, from alongside the Dreadnought, I was assisted in the chemic side by Odling, and Hassall in the microscopic side. During the construction of the easternmost main sewer I had an opportunity, I will not say of enjoying, but of experiencing a festivity under conditions which few excepting professional sewermen can appreciate. I accompanied a Committee of my Vestry and the Surveyor in an official survey of the sewer. We descended into this subterranean canal by a hole near St. Luke's Asylum, walked along as best as we could, breathing the balmy sewer air, to a point at the East End of London, where we emerged.

"It is needless to say that as a safeguard against accidents, we took with us a supply of alcohol ; and, to make our visit and report more picturesque, we stopped on our way and had lunch with what appetite we could muster. This experience taught us, I hope, to look with indulgence upon the occasional breach of the law of temperance by professional sewermen. On coming into the free air above I felt as I fancy Dante felt on passing from the Inferno into Paradise. No one was the worse for the adventure."

THE PAVING OF YARDS.

In reading over the report of Dr. Dudfield, Medical Officer of Health, Kensington, we notice that he draws attention to the condition of the back yards attached to some of the smaller houses in his district. Quoting from a draft report of a special committee, he states that they were "struck with the bad state of the yards at the backs of the houses; 'gardens' there appeared to be practically none. The yards, excepting as to a small portion close to the house, are unpaved and undrained. They were littered, in a neglected condition generally, and in many instances filthy with deposited matters of an objectionable character, including ordure, human and animal. Any filth once deposited must either soak into the ground, whence it will return in hot weather laden with germs, or, becoming dried, will pass as dust from the surface into the atmosphere."

Dr. Dudfield draws attention to the power possessed to compel owners to properly pave the yards, and goes on to observe, "I venture to think that more would be done in this direction, by Sanitary Authorities generally, if due weight were attached to the hygienic importance of cleanliness in the surroundings of dwelling-houses; and I am glad to have the opportunity of enforcing my own feeble utterances on the subject by citation of the views of the Medical Officer to the Local Government Board, who in a recent publication* refers to 'the circumstances of the soil and surroundings . . . favourable to the vitality and multiplication of the typhoid bacillus,' the efficient agent in the causation of enteric fever. 'They are (he states) that the soil should be pervious, that it should be permeated with a sufficiency of decaying (preferably animal) organic matters, that it should possess a certain amount of moisture, and that it should be subject to a certain temperature. And then (he continues) let us consider what means can be adopted to deprive the soil of one or more of these conditions which appear to favour the retention of the vitality and power of the typhoid bacillus, and to prevent that organism from gaining access to the soil in the neighbourhood of human dwellings'; and here my point comes in, the author proceeding to say that, 'to this end he would in the first place advocate the paving of open spaces about dwellings where these open spaces are of small area and are liable to become contaminated with excreta. In this way fouling of, as well as penetration by a pathogenic micro-organism into the underlying soil, is practically prevented.' He adds that 'it is well known, not only that the paving of yards about small cottages and tenement property in towns has in its results been shown to be a public health measure of first importance, but also that the nature of such a measure has depended largely on the use of a form of pavement which really ensures permeability.' The reference to this branch of the subject concludes as follows:—'Where open spaces about dwellings are large, and where organic pollution of surface soil is practically absent, we may rely, as inhibitive of this (typhoid) bacillus, on the influence of sunlight and of alternating weather; but in our towns the conditions have become too artificial, and the open air about dwellings has become too restricted, for us to hope that under the unnatural conditions which have been induced by urban aggregations of dwellings, we have any right to expect the full benefit of Nature's remedies.'"

* "Soil and Circumstance in their Control of Pathogenic Organisms," by Sir Richard T. Thorne, K.C.B., F.R.S., whose observations, it may be mentioned, are based largely upon investigations made for the Medical Department of the Local Government Board, by Dr. Sidney Martin.

SEWAGE PURIFICATION IN GERMANY.

The city of Spandau, near Berlin, discharges its drainage into the river Havel, which in turn empties into the Elbe, and the number of cities located on both rivers below Spandau rendered it most desirable that the sewage should be purified before entering the stream. This subject was considered when the present sewerage system was planned in 1890, and since 1895 the purification plant has been constructed, and is now in successful operation. An excellent account of the method, including details of construction and cost, is given by Herr Pfeffer in the *Gesundheits-Ingenieur*.

The general method adopted is that of clarifying the sewage by use of a solution of chloride of iron, which precipitates the albuminous matter and phosphoric acid, and also checks the formation of sulphuretted hydrogen and sulphide of ammonium, thus removing much of the foul odour. Further purification is effected by the addition of carbon in the form of finely-powdered lignite or brown coal, and a proportion of milk of lime is also added to assist in the precipitation.

The chloride of iron solution is cheaply prepared by treating bog iron ore with crude hydrochloric acid, and this solution is used in the proportion of fifty grammes to the cubic metre of sewage, while about three times as much milk of lime is added. The lignite breeze is finely ground in a mill and mingled with water to the extent of 12 to 13 per cent., forming a liquid of about 7 deg. Beaumé density; and this is added to the sewage in such quantity as to correspond to about 1·5 kilograms of coal dust to the cubic metre of water. Instead of chloride of iron, the oxy-sulphate of iron may be used, in the proportion of 200—300 grammes to the cubic metre of sewage. The liquid is then passed into suitable settling tanks, from which the solid matter is drawn off from time to time by a system of suction chambers, and delivered to a filter press, where it is compressed into blocks suitable for burning.

It is found by experience that, for every 100 parts of solid matter added to the sewage for purification purposes, 160 parts are obtained in combustible blocks from the filter press, so that 60 per cent. of the matter has been abstracted from the sewage.

The plant at Spandau has been constructed in accordance with experience gained with similar methods used at Potsdam and at Leipzig, and in the latter city the investigations of Professor Dr. Fr. Hofmann showed excellent results, so far as the sewage purification is concerned.

HEALTH LECTURES AT KEIGHLEY.

ON Monday evening, the 31st January, Miss Ravenhill, of the National Health Society, brought her series of lectures at the Co-operative Hall, Keighley, to a close with an address upon "The Machinery for Securing Public Health: Our Power Over it."

Miss Ravenhill observed that although it had been well said that local government was at the very essence of national vigour, it was a curious and unmistakeable fact, she thought, that there was no question of importance in which people took a smaller interest than this of local self-government in health matters. The very fact of our retaining self-government carried us back to the days of the Romans, when each town had its municipal body. The whole question of local government in England had taken on a new aspect during the last ten years, but she would ask them to cast their thoughts back for a few moments to some sixty years ago, when the Municipal Reform Act was passed. Those cities which held charters of incorporation at that day had held them for many hundreds of years, but the view with which the municipal councils had been elected became quite lost sight of during the turmoils and wars of the Middle Ages, and they had been chiefly concerning themselves in really fostering abuses of many kinds, financial as well as administrative. After the passing of the great Reform Act of 1832, which swept away so many pocket boroughs, there was time to turn attention to the reform of municipal corporations, and the Act of 1835, constituting municipal boroughs upon a model basis, resulted. It was strange to recollect that only sixty years ago large towns, such as Manchester and Birmingham, had no charters of incorporation, and that their system of local government was carried on in a more vague and perfunctory manner than could be found in the most remote country village to-day. The number of towns which had since applied to the Privy Council for a charter of incorporation was 125, and the total number of municipal bodies now in existence was 308. Miss Ravenhill went on to speak of the relations and duties of the Local Government Board, the County, Town, District (Urban and Rural) and Parish Councils, and she pointed out that women had no right to sit on Town and County Councils. She hoped, however, that they would soon gain that right, and she thought the case in regard to the County Council was especially strong, seeing that this body had to deal with the lunatic asylums and reformatories, and thus had the management of women and children entrusted to them. The lecturer deeply regretted that women did not exercise their voting powers in local elections as regularly as they ought to do, and she contended that they ought to fulfil their obligations, because the right to vote carried with it the responsibility. She afterwards alluded to the need of women Inspectors, and to the duties of Medical Officers and Sanitary Inspectors, and described the essentials of a model town—clean streets, public baths and wash-houses, parks, libraries, asylums, hospitals, &c. In conclusion, she dwelt upon the standard of sanitary duty, and showed how the application of knowledge, self-help, and sympathy to these questions would enable much to be done towards the general well-being.

THE DETECTION OF PLUMBING DEFECTS.

FOR several years Edinburgh has had its unofficial system for the expert sanitary examination of dwellings. There is now in New York City, a somewhat similar undertaking, under the name of the Building and Sanitary Inspection Company, and they "offer their services to those who live in houses, for the discovery and correction of causes of unhealthfulness in the appointments and environment of the dwelling." A few years ago one of the most aristocratic apartment houses in the neighbourhood of Central Park experienced an invasion of diphtheria, and though there were several victims in different rooms, the evidence was nearly conclusive, that it had originated in the house: and one bereaved father called in a sanitary engineer, in spite of the protests of the indignant owner who told of how much money he had spent on his ornamental bathtubs and nickel-plated pipes. The expert found that the ventilating pipe that should have gone out at the roof, and extended above it, left off at the lower side of the ceiling of the upper storey and was there replaced by a painted cylinder of wood, which passed up through the storage attic. The noisome exhalations could do nothing else than diffuse themselves throughout the house, and the outraged inmates took the matter to Court, where there was a preliminary hearing; and rumour had it that the murderous owner of the building paid fabulous sums to "buy off" his tenants, and immediately had the most faultless of plumbing put in under the direction and inspection of a competent sanitary engineer. This could not recall to life the dead; and with variations the above is a story that is repeated again and again every year, and tenants and owners are very active after the mischief is done. Had the people who suffered from this landlord's cupidity caused an examination to be made before they rented their rooms, a wholly different result would have been seen. Is it possible that careful fathers who are good business men in other matters, can have been inveigled into attempting to live in houses where eighty in a hundred are defective in the vital point of healthfulness? They were not inveigled, they were simply satisfied with their own judgment, or took on trust the assurances of agents or owners. Many houses were carefully plumbed according to the lights of the time when they were built; but in some the plumbing is worn out, and when a replacement is suggested there is a distinct painful thrill in the pocket nerve of the owner, and he fights it off as long as possible; and where he suspects that there should be a thorough overhauling, but the prospective tenant does not push his inquiries, he soothes his conscience by the thought that "the sanitary condition of a house is, after all, a matter of concern only to the people who live in it." But if neglect is proven and taken to the courts, he wishes he had not waited to be forced to do right. There has arisen in some quarters a tendency to ridicule the idea that the germs of disease are to be found in the emanation from defective pipes, and though there is no doubt a degree of high health and robust constitution that can resist their action, there are thousands who suffer from what for lack of a more definite classification, they call "malaria."

THE SANITARY CONSTRUCTION OF HOTELS.*

By GEORGE VIVIAN POORE, M.D., F.R.C.P.

HOSPITAL architects are quite alive to the necessity of limiting the height and breadth of wards, and of providing windows on both sides, and it is high time that hotel architects began to recognise that public rooms, in order to be decently wholesome, demand an equal attention on their part to the scientific principles of construction.

Hotels, as a rule, are much too high, or in other words, the cubic contents of the building are far too great for the area occupied. The lifts and staircases are often without independent ventilation, and each floor ventilates into the floor above and the floor below. The corridors are often close and dark, and there is seldom any adequate provision for flushing them with fresh air. These huge hotels, where the guests are literally piled in heaps, are most unwholesome. They are the products of cities, and are totally unsuited for climatic health resorts.

They may be a necessity in cities where the price of land is high, but they are not necessary in the country. Nevertheless, I have seen such hotels standing in the middle of ten acres of land, a fact which thereby shows that neither architect or proprietor have been imbued with the principles of wholesome living.

The mediæval colleges as seen at Oxford and Cambridge, and which are, of course, in a sense hotels, appear to me to offer excellent models which the modern hotel architect would do well to adapt to his purposes. They have, as a rule, ample curtilage, the public rooms are big, and often in a building distinct from the living rooms, while the living rooms are quiet and connected with the public rooms by cloisters and covered ways.

In houses destined for the reception of invalids, it is necessary that the sleeping apartments should be quiet, and that the occupant should not be disturbed by his neighbours. In the ordinary flimsily built hotel, the restless invalid is exposed to the annoyance of noisy neighbours above, below, and on either side, while the traffic in the corridor is more or less incessant. All this is obviated by having thick walls and floors, and double doors, such as are common in the mediæval college. It is obvious also, that guests are much less likely to annoy each other, in proportion as the ground area of the building is ample and the height is kept down.

It is, of course, absolutely necessary that the gases of putrefaction should not gain access to the building. If the sanitation be on the unscientific lines which are now almost universal, *i.e.*, the deliberate formation of putrescible mixtures of organic matters and water, and their storage in underground traps, sewers, and cesspools, it is quite impossible to be sure that the gaseous "toxins," the products of putrefaction, shall not gain access to the house. The hotel architect is bound to take as much trouble to minimise the chances of sewer poisoning as does the hospital architect.

In all hotels to which people go for a prolonged sojourn, there ought to be out-door accommodation provided in the grounds, for ladies as well as gentlemen, and there can be no difficulty in ensuring proper seclusion. The gentlemen's "garden" should be reached from the smoking room by a covered corridor, while the ladies' "garden" should in a similar way be approached through the ladies' boudoir. A set of well-designed dry closets such as I have advocated in my books on "Rural Hygiene,"* and "The Dwelling House,"* if properly attended to every day by a scavenger, would certainly be a great comfort to the guests. It goes without saying that no hotel can be really wholesome unless it be provided with garden ground sufficient for dealing day by day with all the putrescible refuse of the house, which should be made to produce flowers, fruit, and vegetables, instead of sore throats and typhoid.

I know of one instance in which the proprietor of a large establishment, without destroying his water-closets, put up "dry closets," as it were in competition with them. These latter were well looked after by the gardener's boy, and in a very little time he was able to abolish his water closets, to save the daily cost and trouble of pumping water, and while the plumbers' bills were sensibly diminished, his land increased in beauty and productiveness.

In an article like the present it is impossible to enter into much detail. Those who may concur in the ideas put forward will get every information in the books alluded to.

Dust and Disease.—It is known that certain diseases are spread through the medium of infectious dust. Consumption, pneumonia, influenza (la grippe), and diphtheria are among the diseases so spread. Some consumptives with localised tubercular deposits are spitting up tubercle bacilli with no suspicion of the tubercular nature of their disease; many other consumptives, some curable under favourable conditions, some less hopeful cases, go to places of amusement though expectorating daily millions of bacilli. The germ of pneumonia finds a habitat in the mouths of many healthy persons awaiting the coming of its opportunity for mischief by the temporary physical deterioration of its host, or by transference to other human organisms whose vital conditions do not confer immunity. Influenza is also an infectious disease spread by the discharges from the nose and throat. The diphtheria bacillus is also found in the throats of some persons who have never had recognisable diphtheria, and it remains some time after the disease in the throats of some of those who have had diphtheria. These disease germs which are found in the sputum of some persons, retain their vitality for quite a while even under the influence of desiccation. The bacillus of tuberculosis in dried sputum retains its full power for harm for a long while. Thus, sputum that has reached the floor, and dried, is reduced into a dangerous infectious dust.

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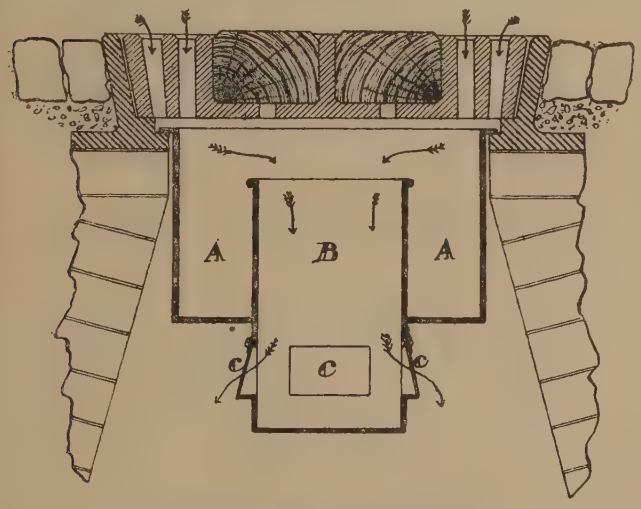
* Extract from a paper contributed to the *Journal of Balneology and Climatology*.

* Both these books may be obtained post free from the Sanitary Publishing Company, Limited, on receipt of the published price.

IMPROVEMENTS IN SEWER VENTILATION.

SOME PARTICULARS OF AN INVENTION WHICH WILL HELP TO SOLVE THE PROBLEM.

MR. PERCY MUNROE BEAUMONT, Borough Surveyor, of Maldon, Essex, has provisionally patented an invention the object of which is to provide sewers with means which will allow fresh air to pass into them, but will at the same time prevent the escape of the sewer gases through the opening provided for the admission of fresh air. According to this invention—an illustration of which is appended—the manhole or other opening in the sewer is provided with a dirt basket or receptacle forming a trap for the interception of stones, dirt, or other foreign matter passing through the grating. This dirt basket or receptacle has an inner tube or channel which forms an air passage to the sewer; to the lower end or sides of this passage one or more non-return valves is or are arranged opening towards the sewer. More than one of such inner tubes or channels may be used if required. Air passing through the ordinary grating of the manhole or other opening in the sewer enters the sewer through the valves in the inner tube or tubes. Should the pressure of the sewer gases be greater than that of the air in the dirt basket or receptacle the valves will be closed, and the exit of gases through the manhole or other opening thus prevented.



— Section thro' top of Manhole — shewing combined Air Inlet and Dirt Box in position

Struck by the above particulars of the invention given by Mr. Beaumont in the course of a visit to THE SANITARY RECORD Office, we asked him to supply us with further information concerning it, and in response to our request he wrote as follows:—

"Like, I have no doubt, most other engineers who have open manhole covers in their borough, I am constantly receiving complaints of the great nuisance arising from them, and the difficulty has been to know what to do with them. Some Local Authorities direct their engineers to close the manhole covers, and erect ventilating shafts where possible, whilst others simply have the manholes closed, and provide no outlet for the sewer gases. In my opinion the closing of the manhole covers is a mistake; they should be made to act as air inlets in conjunction with ventilating shafts, gas destructors, or other foul air extractors, and it was to meet this view that I designed my combined air inlet and dirt basket as being a suitable and cheap way of carrying out this object. This invention simply takes the place of the ordinary dirt basket, and can be made to suit any manhole cover, so that there is no expense of altering cover or providing new covers. In many cases the existing dirt boxes could be converted at a small cost. I may add that I have had two or three of these combined air inlet and dirt boxes in use for some time in manholes, which were a great nuisance, and they have proved in every way successful."

Primâ facie, Mr. Beaumont's invention appears to fill a long-felt want, and we do not doubt but what its claims to notice will appeal strongly to every engineer who has had the difficult question of sewer ventilation to contend with.

SEWAGE DISPOSAL.

AT a meeting of the Manchester Chemical Association, held on Friday evening, the 4th inst., in the Owens College, Dr. Grossmann read a paper on "The Treatment and Disposal of Town Sewage." He described the various processes of precipitation, and also the bacteriological treatment. As regarded Manchester, he thought it would be better to continue endeavouring to obtain the best effluent possible rather than carry away the whole of the sewage. He believed, from calculations he had made, that the water remained unchanged in the Ship Canal for probably a fortnight on an average, and if a fairly satisfactory effluent were obtained by proper treatment it would therefore be necessary to disinfect such effluent to avoid putrescence. He proposed to use sulphuric acid for that purpose. Dr. Grossmann dealt with the cost of this. Sixteen grains of acid to the gallon of effluent would be sufficient, and even if the cost amounted to £10,000 per annum it would be cheap to the city, and leave open the question of the adoption of a better scheme if one could be safely devised. He proposed to use lime as the precipitant. He advocated the appointment of a committee by the Society to examine the various methods of sewage purification and report upon them, and thought that it was time the Government took up this important question. Mr. G. E. Davies, who presided, said that some years ago the Society of Arts appointed a committee to inquire into this question. They examined twenty methods, all of which had been described as perfect, but all of them in practical application

turned out to be failures. Mr. Carter Bell said that the experiments made on a large scale with the Salford sewage had convinced him that there was no better precipitant than lime. If from twenty-five to thirty hundredweight were used per million gallons of sewage you got fair precipitation. Afterwards, when the effluent had been neutralised by sulphuric acid, it was fit to go into the Ship Canal.

THE UNSATISFACTORY CONDITION OF REFUSE DISPOSAL IN AMERICA.

REFUSE disposal in America is, according to the *American Engineering News*, in a very unsatisfactory condition. Only a comparatively few cities, remarks our contemporary, have adopted any modern method of disposal, and in many of these the cost of the work is altogether too high, and complaints of nuisances from the disposal plants are frequently made. This deplorable state of affairs is largely due to the fact that as yet the problem has not been approached in so thoroughly scientific a manner as have other problems in engineering. While scores of our most prominent engineers are connected with the development of water supply and sewerage systems, it would be hard to name three engineers of high professional standing who have designed any of the refuse disposal plants now in operation in this country, or taken any essential part in the evolution of such systems of refuse disposal as are now in use.

Nearly all the refuse furnaces in the United States have been evolved by mechanics and artisans of an inventive turn of mind, supplemented by suggestions from small capitalists and sales agents financially interested in the matter. Many of the different makes of furnaces, naturally enough, are but slight modifications of earlier makes. Of refuse utilisation or reduction plants most have been developed by men connected with rendering establishments devoted to the production of grease and fertilisers from old bones and dead animals.

Both cremation and utilisation systems are sadly in need of being taken in hand by competent engineers. The reasons why this has not already been done are various. The most important are that as a class the inventors in these lines have not been engineers at all, and, like the vast majority of inventors, have been so possessed with their own ideas that they have failed to make any real study of the state of the art, further than in connection with trials of their own devices. Both these inventors and the small capitalists whom alone most of them have been able to interest have shunned engineers, partly through jealousy and partly because they did not wish, or thought they could not afford, to incur the expense of consulting them. This has been true of the inventors in both lines, but more true of the capitalists interested in cremation than those who have taken up utilisation processes.

Many of those who have become financially interested in utilisation processes would not of themselves hesitate to spend money for the best engineering advice, but the inventors whom they have backed have declared such expenditures unnecessary and the capitalists themselves often yield to the temptation to work for the speculative profits arising from stock dealing rather than the slower, and perhaps smaller, returns from the business itself. Doubtless the speculative aspects of refuse utilisation processes have contributed largely to keep our best engineers from taking up the subject. They could be induced to give their energies to the development of such systems only when allowed to work along scientific lines, whereas their possible employers have been unwilling to expend money for this purpose, through ignorance or impatience to realise quick profits instead of putting money into experimental researches for future returns. Where speculative ideas have ruled there has been little opportunity for work by an able and conscientious engineer. His services would be desired to bolster up a system, as developed, rather than to search out and remedy the weak points of a system.

In saying what we have we do not mean to convey the idea that there are no good refuse disposal plants or systems in this country. We believe that there are a few which either already have been or are capable of being brought to a high degree of perfection, although most of both plants and systems have many unsatisfactory features. . . . We think it probable that the English type of refuse furnace comes the nearest of anything yet evolved to what a refuse furnace should be.

NATIONAL REGISTRATION OF PLUMBERS.

MEETING AT EXETER.

ON Saturdry evening, the 29th ult., a meeting of the Exeter branch of the Devon and Cornwall Council of the National Registration of Plumbers met at the Guildhall. Alderman Domville presided, and amongst those present were Messrs. W. S. Addiscott and Harvey (Plymouth), Warren, Cole, C. Kerslake, J. F. Ralling, Symes (local secretary), &c.

The CHAIRMAN said he considered it right that as a medical man he should accept the invitation to preside over the meetings of a society which had such far-reaching results in the matter of public health. The work which plumbers did, although hidden, and not gaining so much honour and glory as work that was more open, was of transcendent importance now, when sanitary science required that each little household should be fitted with every possible convenience. Whilst it was all very well for theorists to censure and criticise, that was not of so much value as the work the society had undertaken to carry out of starting from the commencement and giving no consideration to anything but real, thorough, honest practical knowledge. The object which the Plumbers' Company had in view was worthy of the assistance of every citizen. They were twitted that Englishmen were losing a good deal of their old-fashioned handicraft which had made them famous in days gone by. It was something, therefore, for a band of men like themselves to have decided that they would admit no one into their company until he had proved his efficiency.

Certificates were, after the usual declaration had been subscribed to, presented to the following, who had passed the necessary examination: Charles Robert Woodland, Harry Crudge, G. W. Carter, W. J. Cockram, and A. J. Bolt. A hope was ex-

pressed that at the next examination, which would probably be held at Exeter, the district would send up a larger number of men to qualify.

Mr. W. S. ADDISCOTT then read the following paper :—

Some twelve months since it was my pleasure to stand here and say a few words to the plumbers of Exeter on a similar occasion as that which calls us together to-night. We are here to-night also as a proof that we wish to uphold and support the work of the Exeter Committee of which you, Sir, are the respected chairman. It is always gratifying to find our leading citizens willing to forward such movements as ours. On the last occasion we were honoured by having the Mayor of this city in the chair ; this year we are equally honoured by having a member of the Health Committee. Therefore it is with genuine pleasure that I have to thank you, on behalf of the Worshipful Company, for presenting these certificates and presiding, not only at this meeting, but at the meetings of the local committee from time to time. Further, it is our desire to place our work before those who have the administration of the laws affecting the public health, because we feel they are best able to judge of its value.

The Worshipful Company is not the largest, wealthiest, or oldest of the City Companies, but we claim as a set-off to these shortcomings—if shortcomings they be—the Plumbers' Company is one of the most useful, applying its funds for the education of the craft from which it take its name. It gives young plumbers the opportunity of learning the technicalities of their trade, grasping the why and the wherefore work has to be performed in certain ways, without their doing it solely because their fathers did it before them. In furtherance of this idea the company has called into existence a system of examinations for men who are coming up in the trade, and if it were only for this it deserves our heartiest thanks. The method by which the examinations are conducted may be explained in a few words. They are divided into two sections — theoretical and practical. For the latter stage examiners are appointed by the District Council and Local Committees such as you have here. These examiners are taken in rotation as they come on the list, and not only have two masters and two operatives to remain in the examination-room the whole of the time during which the examination is being held, to see that the time of starting and finishing is complied with, but the secretary has to furnish the examiners with a list of the numbers of the candidates on a sheet, upon which remarks on the manner the candidate sets out his work and proceeds to complete his task is done, noting any extra skill that may be adopted. Two men may do the same work with good result, but by the use of technical knowledge acquired in the school one would not work as hard as the other. After the work has been completed, the time noted, and the candidates have left the workshop, the work is then judged on the spot, not sent away to be examined by those who never saw how it was done. By this method we contend the candidates have every advantage given them. In the theory questions are embodied the manufacture of the articles used by plumbers, such as the composition of various solders, fluxes and their uses, planning and setting out house drainage and general sanitary work, bye-laws of the governing bodies relating to sanitary plumbing hydrostratics for pump work, setting out sheet lead with the greatest economy to save the pocket of the employer and the employer's customers, and many other points too numerous to mention.

In addition to this the company has instituted a scheme known as the "graded scheme," by which apprentices may acquire the necessary knowledge by degrees, and according to their requirements. A lad who has been at the trade two years can sit for the preliminary stage. After four years he sits for the intermediate stage, and on the completion of his indenture can sit for the final, upon passing which he is granted his certificate of registration. The practical tests comprise in all stages, work in pipe bending, soldering, lead burning, lead dressing and setting out, all having a direct practical bearing on the every day work of the plumber. When we view this by the side of the statement made in the *Engineering Magazine*, that "the question of wages seems to have very little bearing upon the capacity for competing," and in another magazine article, *The Review of Reviews*, that "we are being beaten because we are not so smart, not so brainy, so scientific, so capable, in short, as our rivals," we can claim that the work the Worshipful Company is engaged in must tend to remove this reproach from us. What the Worshipful Company is doing may with profit be followed by other City Companies to elevate the crafts from which they take their name.

Some may argue from my remarks that we are training a race of black-coated and white-handed plumbers, who will want to do all the overseeing and leave the practical actual work to the plumber's mate. Gentlemen, the very system we adopt will prevent this, because we insist on the practical test as well as the theoretical before we grant any man his certificate, so that when a person states he is a registered plumber you have not to treat with one who is only a paper plumber, but one who is actually a worker in lead. There are certificates for what is known as paper plumbers (I have one myself), but I candidly confess I am not a plumber. Yet there is no law to prevent my foisting myself on the public as a "certified plumber," and the general body of the public would not distinguish the difference between the certified and the registered ; but there is a difference, as I have shown you. This would not matter so much if there were not persons who advertise themselves as certified plumbers, with the direct object of misleading the public to think they were registered.

With a view of preventing such misunderstandings as I have indicated, the Worshipful Company has from time to time brought into the House of Commons a Bill known as the "Plumbers' Registration Bill," having for its object the safeguarding of the public health by enabling persons employing plumbers to select, when they desire to do so, persons who have given evidence of their qualification for plumbers' work. The Bill does not contemplate a monopoly ; it does not interfere in any way with the rights of non-registered plumbers. It, however, prohibits, and rightly so, such plumbers from representing themselves as registered. It was this Bill upon which I spoke some twelve months since, and in the words of a familiar verse I have again to tell you "the old, old story" of vested interests and factious opposition preventing a useful measure being placed upon the statute

book of this land. It was my good fortune to be in the House last June and July when the Bill came up for discussion, and I was struck with the unanimity with which the principle of the Bill was received, that is, the principle of the need for a measure to protect the public from the effects of bad plumbing. One speaker complained that no provision was made for inspecting work; another complained it would lead to that, and create a staff of officials, two opponents of the Bill not agreeing on that point. Other arguments against the Bill were used, not because the measure, as I have said, was disapproved in principle, but on account of engendered opposition on the part of vested interests. It has been said by some that the matter is one of financial profit to the Company, one speaker going so far as to say that what the Plumbers' Company care for was not the educating of the plumber, but the monies to be received in fees. Well, gentlemen, there never was a weaker argument advanced than that against any measure, but in this case it is not worth noting. But it is one that I often meet with in my connection as secretary to this Council, and therefore I will refer to it with a view of removing any misconception you may have in your minds on the subject. The Bill does not seek to alter the present arrangement with regard to the liability of the Company in this matter. At the present time the costs of the examinations are borne by the Company, these expenses including the cost of materials, fires, attendance, examiners' fees, and all other incidental expenses. Now, supposing that twelve candidates presented themselves for examination, each having to be provided with sheet lead, lead pipe, solder, and in many cases rent of workshop to be paid for, as a result of the examination, perhaps one, or maybe two, would be granted certificates of registration, which upon its being taken up by the candidate would mean the payment of 10s. 6d. on the part of an operative, and £2 2s. on the part of a master, thus working out at profit of, say, £1 1s., costs £7—not much of a money-making or fee-grasping concern, as represented by one of the speakers in the debate. Another speaker announced that the Bill would put "a ring fence round a trade." Now the Bill expressly states that no interference is to take place with the men who are not registered. If a genuine system of apprenticeship, such as existed in years gone by, could be insisted on and carried out, you would then have what the opponents to the Bill describe as a ring fence, but such a thing is not created under this Bill. The objectors to the Bill desire to see the teaching of young plumbers solely in the hands of book-learnt teachers, whilst the Company seeks to place the teaching of young plumbers in the hands of good practical experienced men, who may be at liberty to call in any scholastic aid that may be required. But all hands seem agreed, as I have already said, on the principles of the Bill, the chief opposition being the method of examination, practical *versus* theoretical.

Now I come to the question of those men who have been in the trade prior to a date named in the Bill—that is, prior to 1887. If the person who is desirous of being registered can produce satisfactory evidence that he served his time at the plumbing trade, having actually used the tools, not like many who seek to be registered because they have worked with their fathers in the front shop over the counter, these persons whilst engaged in the trade are not considered plumbers in the true sense of the word. It would be manifestly unfair to keep out such a man, who may perhaps have worked for upwards of thirty or forty years at the bench, or to make him take his stand in the examination-room by the side of a younger man who had received all the advantages of the technical schools with its higher training. Therefore, the Bill provides that these men shall, upon satisfactory proof, be registered without having to go through the examination—an arrangement at once fair and just. The Bill does not seek to in any way interfere with the questions which at times agitate the country in relation to capital and labour, the aim being purely educational, and to protect those who are capable of being registered from being confused with those who are not, viz., with what I have described as the paper plumber. I do not wish to say a word against these men, only they must not pose as practical men when they are not—that is, they must not lead the public to think they are registered. Now, having given you a brief summary of what the Bill proposes to do and what it proposes not to do, may I ask your support to a plain resolution which I shall propose, that is:—"That this meeting of public representatives of master and operative plumbers of Exeter and district desires to express its approval of the efforts of the Worshipful Company of Plumbers to elevate the craft, protect the public from bad plumbing, and to give effect to these objects by the Bill about to be promoted in the House of Commons during the forthcoming session of Parliament." I feel sure that if you give your approval to this resolution you will help the Company, the public, and the craft to place upon the statute-book that measure which is the legitimate aim and aspiration of the interests I have named.

The motion was seconded by Mr. COUNCILLOR COLE, supported by Mr. HARVEY, and carried unanimously.

The CHAIRMAN pointed out that those who wished to be worked up in the theory of plumbing could, by making an application to the principal, get a class started at the Exeter Technical College.

On the motion of Mr. KERSLAKE, seconded by Mr. STONE (Crediton), a vote of thanks was passed to the deputation from Plymouth, and the chairman was also thanked for presiding.

FLINTSHIRE.—An epidemic of diphtheria has broken out at Mostyn, Flintshire, forty cases having been recorded in fourteen days, and so far eleven deaths have occurred. The Medical Officer is not satisfied as to the cause of the outbreak, but advocates watchfulness over the milk supplies.

Duration of Immunity after Vaccination.—According to Jasiewicz, the immunity from vaccination lasts a much shorter time in infants than is generally supposed. A study of the statistics of the subject showed a proportion of 7·35 per cent. out of twenty-three children under six years of age in whom vaccination was successfully performed. The author, therefore, recommends more frequent re-vaccination in childhood, and expresses the opinion that children are also protected from other infectious diseases thereby.—From the *Journal de Clin. et Ther. de l'Enfance*, July 29th, 1897.

Institute of Sanitary Engineers

THE CHEMICAL EXAMINATION OF WATER.

By RICHARD HORTON.

AT the monthly meeting held on the 3rd inst., Mr. Richard Horton read a paper on the above subject. The chair was occupied by Mr. Dove.

Mr. HORTON said:—The variety of knowledge required of sanitary engineers is extensive, and one would perhaps think that the chemical examination of water would be best left in the hands of experienced chemists. It may, therefore be as well to say at the outset, that it is not the intention of this paper to advise the tacking of another science to one already heavily laden, but it is intended to suggest that some acquaintance with the subject is necessary to all sanitary engineers who aspire to be, as nearly as possible, up to date.

It was, until comparatively recent times, considered that the analysis of water afforded a most reliable guide as to its safety for drinking purposes, but it is now considered by some authorities that a bacteriological examination is the only test; by others, that a judgment based upon chemical analysis and bacteriological examination taken conjointly is best; whilst others affirm that the bacteriological examination is of little value unless carried out more carefully than it is at present; that it is not sufficient to know the number of bacteria in a cubic centimetre of the water, and whether they do or do not liquefy gelatine, but that it is absolutely necessary that the particular organisms present should be identified before a water can be either recommended or condemned.

The latter view of the matter seems very rational, and when the examination is required to trace the cause of an outbreak of some zymotic disease, the argument is unanswerable, but such an examination, or anything like it, is utterly impossible to the sanitary engineer who has to give, very often in a couple of days, his opinion as to the safety of a house for habitation.

In the case of London houses, it is simply necessary to ascertain that the water is not fouled in any way by insanitary arrangements; information as to the chemical purity may be had from official reports; but in country and outlying districts the water supply needs very careful consideration. When the supply is from shallow wells, the water is generally uncertain, and therefore unsafe to drink; but deep wells are by no means beyond suspicion. In my own experience, a house near Tunbridge Wells was examined, and found to be in a fairly sanitary condition, and the water affirmed by the owner to be very pure, as it was drawn from a deep well. I brought a sample back to town, and upon analysis discovered that it was unmistakeably polluted, and reported accordingly. On a second visit, the well, which was in cultivated ground, was opened for my inspection, and proved to be 60ft. deep, the source of impurity being very evident. About 20ft. of the upper part was built of loose brickwork, and every facility afforded for draining the manured ground into the well. This was rectified and the well cleaned, the water subsequently drawn from it showing on analysis a very marked difference, as I will show later.

An owner generally informs an inquirer that the well is very deep, and the experienced observer will sometimes notice the pump fixed above the ground level, with a smile of unbelief in the assertion; but it is not always safe to trust entirely our first impression as to the depth of a well. A year or two since, in North London, a well was condemned and the owner ordered to lay on water from the town supply. I managed to secure a sample of the water, which, upon analysis, proved of very good quality, and unlike what one expects from a well of 18ft. in depth, as this was supposed to be. An examination of the water made subsequently by the Public Analyst showed similar results, and the well was afterwards discovered to be 68ft. deep (363ft. above sea level), the water keeping at a constant depth of about 58ft. The Public Analyst's remarks appended to his results were as follows:—"These facts show the water to be one of high organic purity, and of far better quality than the mass of the water supplied to London. It is perfectly free from the least suspicion of contamination with sewage or surface drainage." The well was, of course, not closed.

At about the distance of half a mile above is another well, which is 374ft. above sea level, 23ft. deep, and placed under a kitchen floor. The Public Analyst's examination of the water from this well showed 25·38 grains of chlorine, as common salt, to the gallon, but rather curiously no free ammonia, and only ·071 parts per million of albuminoid ammonia, the total solids being large, 75 grains per gallon, the nitrates being in large quantity. The analyst reported:—"I am of opinion that this water consists largely of surface drainage as indicated by the large quantity of matter in solution, consisting chiefly of chlorides and nitrates. Such waters are not safe for drinking purposes."

I have mentioned the above cases to show that a fair opinion may be arrived at from a chemical analysis of water, at all events in some cases, I believe in most; there is, perhaps, some difficulty when the results of an analysis approaches the border line which lie between a safe and an unsafe indication of purity, or the reverse, but in such cases the sanitary engineer has simply to state his results, and leave the matter to experts.

There are practically two processes in use for the estimation of organic impurity in water:—(1) Frankland's process, by which the organic nitrogen and organic carbon are evolved from the combustion of the residue obtained from the evaporation to dryness of a given quantity of the water, and then measured; (2) Wanklyn's process, in which a certain proportion of the organic matter is decomposed, and the ammonia evolved (called "albuminoid ammonia") is measured.

Frankland's process is the one used, I believe, by the water companies, and by Dr. Frankland himself in his official analyses, but as it must be worked by experienced chemists, the process cannot be recommended for the use of Sanitary Engineers. Wanklyn's process, on the other hand, presents few difficulties, and its working is very simple, needing only care and properly standardised solutions, the latter being readily obtained from Messrs. Sutton, of Norwich, or their agents.

The following are usually determined by analysts in their examinations of water samples :—

Total solid matter, in grains per gallon :—Chlorine, as common salt ; nitrogen, as nitrates ; nitrites ; free, or saline, ammonia, in parts per million ; albuminoid ammonia ; poisonous metals, in grains per gallon ; and oxygen consumed in a given time, at a certain temperature.

Of these it will probably be sufficient for a sanitary engineer's purpose to estimate :—Chlorine, free ammonia, albuminoid ammonia, and to make a rough test for poisonous metals. Examinations for nitrates, and also the determination of oxygen consumed, may be undertaken with a small additional outlay for apparatus, but weighing the total solids will require the use of a fairly accurate balance.

To ascertain the amount of chlorine in a sample is a very simple matter, the following apparatus and solution being required :—

A 100 c.c. graduated measure, a white porcelain basin capable of holding about 100 c.c. a small burette and stand, a standard solution of silver nitrate, containing 4·79 grammes of silver nitrate to a litre of distilled water (one cubic centimetre of which solution is capable of precipitating one milligramme of chlorine), a little potassium chromate, and a small glass rod. The operation is as follows :—

Measure exactly 70 cubic centimetres of the water into the basin, and stir in about 20 milligrammes of potassium chromate, which will tinge the water a distinct yellow, fill up the burette with the standard solution of silver nitrate, and adjust by means of the tap, so that the surface of solution is level with the zero mark, then run the solution very gradually into the prepared water. As each drop touches the surface a dark red colouration will appear at the point of impact, which upon stirring with the rod will disappear, and the addition of silver nitrate solution is continued until the red colouration becomes permanent, the process being closely watched, and stopped when the faintest red colouration is permanent. The number of cubic centimetres used is then read off the burette, and as each cubic centimetre of the standard solution represents one milligramme of chlorine, the amount read off indicates the number of milligrammes contained in 70 cubic centimetres of the sample taken.

As it is usual to return the amount of chlorine found in grains per gallon, and a gallon of water weighs 70,000 grains, therefore 70 cubic centimetres, or 70,000 milligrammes of the water are taken, so that — parts per 70,000 may be correctly read as — grains per gallon.

The process depends upon the fact that water containing chlorine forms a white precipitate with silver nitrate, but as it would be impossible to determine the point at which all the chlorine was satisfied, potassium chromate is added, which at the critical point forms red chromate of silver with the nitrate, the silver not combining with the chromic acid of the chromate until all the chlorine is used up. The water should not be acid, as chromate of silver is dissolved by acids.

Chlorine, as common salt, exists in urine and sewage, and as a natural water, unless taken from the neighbourhood of salt springs, does not contain it, except perhaps in small quantity, the presence in a sample of a large quantity of chlorine points to pollution with animal or sewage matter ; but, on the other hand, its absence does not by itself prove the purity of the water, as contaminations may be present from a vegetable source.

The chlorine may be expressed as common salt as follows :—Taking the atomic weights of Na (sodium) as 23, and Cl (chlorine) as 35·5, NaCl (common salt) = 35·5 + 23 = 58·5, therefore :— $\frac{58{\cdot}5 \times n}{35{\cdot}5}$ = the amount of NaCl present, when n represents the amount as Cl.

(To be continued.)

General News.

HOME.

NOTICE.—On and after 31st March next the Annual Subscription to this Journal will be raised to 12s. 6d. to all NEW Subscribers. NO ADVANCE will be made to our friends whose names are entered on our Subcription list prior to that date, so long as they continue to Subscribe.

NAIRN.—A special water supply district is to be formed to supply the houses in the vicinity of the town.

MALDON.—The Town Council has resolved to oppose the Bill of the Maldon Water Supply Company, Limited.

HALIFAX.—The Town Clerk has been instructed to apply to the Local Government Board for sanction to borrow £11,200 for the purposes of a small-pox hospital.

BIRKENHEAD.—At the last monthly meeting of the Town Council a resolution was passed in favour of erecting salt-water baths at the north end of the town, to cost £13,000.

LEICESTER.—A Local Government Board inquiry has been held with respect to the application of the Council for the Board's sanction to a loan of £54,000 for the proposed new isolation hospital at Gilroes.

YEALMPTON.—The Parish Council has decided that as the Local Government Board has refused to sanction a loan for a water supply, the matter be referred back to the District Council, asking it to give the matter its immediate attention.

CHAPEL-EN-LE-FRITH. — The Guardians have decided to ask for permission to borrow £864 for the erection of a laundry at the workhouse, and to ask for the sanction of the Local Government Board to the workhouse drainage scheme.

GODALMING.—The Town Council has decided to acquire the water supply of the borough and adjoining districts from the Godalming and Frith Hill Water Company. It is estimated that the waterworks will cost upwards of £30,000.

FRIERN BARNET.—The Urban District Council has resolved to write to the London County Council that the regulations as laid down as to keeping the subsoil and surface water out of the sewers before Friern Barnet took the sewage of the asylum must be complied with.

MAIDSTONE.—The District Council has resolved to apply for an Act of Parliament for the purchase of the waterworks.

TORQUAY.—The Town Council has decided to appoint an Assistant Sanitary Inspector at a commencing salary of £100 per annum, rising to £150.

MANSFIELD WOODHOUSE.—The District Council has decided to make application to the Mansfield Corporation for a loan of £3000, to carry out works of a water supply.

THURSO.—The Burgh Commissioners have unanimously agreed to apply to the Local Authority for its sanction to erect a public slaughter-house on their own ground at the riverside.

HASTINGS.—Samples of the water are submitted monthly to Dr. Dupré, the eminent analyst, who reports that the water, which is filtered through polarite, is of great organic purity, and of the highest class.

NEWPORT.—At a special meeting of the Urban District Council the Sanitary Committee reported that it had visited the Barnhurst farm, near Wolverhampton, and inspected the filtration works there, and recommended the adoption of a similar method for Newport. After much discussion the consideration of the matter was adjourned.

CHESHIRE.—The Mayor of Chester, on the 25th ult., laid the foundation stone of an infectious diseases hospital to be erected at Sealand, about a mile from the city, at a total estimated cost of about £20,000. In Mid-Cheshire a controversy has been going on for some months between the County Council and the Local Authorities as to the provisions of isolation hospitals, but nothing has yet been done.

WATFORD.—The Urban District Council has received from Professor Attfield his quarterly report on the water supplied to Watford from the urban district mains. A sample received by him on January 17th, was clear, inodorous, and palatable, and showed that the water compared favourably with the best public supplies to our cities and large towns. In his opinion the water was of excellent quality for all drinking purposes.

BRIDLINGTON.—A Local Government Board inquiry has been held into the applications of the Urban District Council to borrow £1100 for purchase and construction of a public lavatory on Shiphill at the quay; £1100 for the purchase of land and construction of a wall to enlarge the Council's stoneyard; £1000 for the re-laying and construction of sewage outfall works on the north side of the beach; and £1000 for the making of a new street.

WORCESTER.—In consequence of a recent outbreak of diphtheria at the Cottage Homes of the Workhouse, inquiries have been made, and the result was reported to the Board of Guardians at the last fortnightly meeting. It was stated that owing to the condition of the drains at the Cottage Homes, which are of recent construction, the sewage was finding its way into the soft water tank, as there was no trap to the pipe taking the overflow from the tank to the sewer. It was further stated that sewage a yard in depth was discovered in the soft water tank. It was decided to ask the architects, Messrs. H. Rowe and Son, to meet the Cottage Homes Committee at once.

EDINBURGH.—The Public Health Committee of the Town Council has approved of the recommendation of its sub-committee for the appointment by the Corporation of a chief Sanitary Inspector under the Public Health Act.

LEITH.—The deaths registered within the burgh during the month of January numbered 102, being a decrease of three on the preceding month, and a decrease of 22 on the corresponding month last year, and showing a death-rate equal to 15·7 per 1000 of the estimated population.

KELSO.—The Commissioners of the burgh, after considering Sir Henry Littlejohn's report to the Local Government Board on the water supply of the burgh, have remitted the same back to the New Water Supply Sub-Committee to report on it, with a view to the latter being forwarded to the Local Government Board.

GRANGEMOUTH.—The scarlet fever epidemic which broke out so suddenly, and was traced to an affected farm in the district, is now reported to be abating. There have been forty-three cases notified, which are all of a very mild type. The measures taken seem to have been very effective in checking the disease, as only a few cases have been reported within the last few days.

Personal.

MR. J. TODD has been appointed Medical Officer of the Workhouse, Gateshead.

DR. WILLIAMS has been reappointed Medical Officer for the Town Council of Leominster.

DR. H. MANLEY has been appointed Medical Officer for West Bromwich for the ensuing year.

MR. F. C. YOUNG has been appointed Medical Officer for the Twyford district of Wokingham union.

MR. JAMES MORRIS, A.S.I., has been appointed Assistant Inspector of Nuisances for the borough of Eccles.

H. DONALDSON, M.R.C.S., has been appointed a Public Vaccinator for the district of Gore, New Zealand.

W. C. DAISH, M.D., has been appointed a Public Vaccinator at South Melbourne, Victoria, Australia.

MR. G. R. HARLAND has been appointed Assistant Medical Officer of the Workhouse, Gateshead.

MR. JOHN ROBERTS has been appointed Inspector of Nuisances for the urban district of Llanrwst.

MR. A. J. A. THEOBALDS has been appointed Medical Officer for the Walgrave District of Wokingham Union.

MR. H. J. BROWN has been appointed Vaccination Officer for the Streatham district of Wandsworth and Clapham Union.

H. E. BELCHER, L.R.C.P., M.R.C.S., has been appointed Medical Officer for the West Bridgford sanitary district of the Basford union.

DR. A. W. THOMAS has been reappointed Medical Officer of Health for the urban district of Swaffham, at a salary of £20 per annum.

MR. JOHN STEVENSON, of Ayr, has been appointed Burgh Surveyor and Sanitary Inspector for Girvan, in room of Mr. David Robertson.

F. A. HALLSWORTH, L.R.C.P., M.R.C.S., has been appointed Medical Officer for the Bodenham sanitary district under the Leominster union.

THE Local Government Board has sanctioned the reappointment of Dr. R. Bonstead, as Medical Officer of Health for Hexham, at a salary of £210.

THE Local Government Board has sanctioned the appointment of Dr. Shepheard as Medical Officer of Health for the urban district of North Walsham.

MR. HARRY HOLMES, of the borough engineer's office, Burton-on-Trent, has been appointed engineering assistant in the city engineer's office, Birmingham.

DR. ANNINGSON has been reappointed Medical Officer, and Mr. Master, Inspector of Nuisances for the District of Chesterton, at salaries of £60 per annum each.

THE Local Government Board has sanctioned the appointment of Mr. Herbert E. Bellamy as Chief Inspector of Nuisances for the City Council of Truro, at a salary of £100 per annum. Mr. Bellamy has been an assistant in the Health Department of the county borough of St. Helens for a period of seven years.

MR. WILLIAM SUMMONS, who had for very many years filled the office of Sanitary Inspector and Surveyor at Milford Haven, died suddenly at his residence in that town on Sunday, January 30th. Deceased, who was about sixty-eight years of age, had not enjoyed good health for some time past, but was able to attend to his duties up to the day before his death.

Sewerage Schemes.

[TO MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

THE Rural District Council of Wokingham has referred the schemes dealing with Sonning drainage to a parish meeting.

THE Local Government Board has sanctioned the loan of £2437 for works of sewerage and sewage disposal at Buckfastleigh.

THE Urban District Council of Portishead is about to apply to the Local Government Board for sanction to borrow £3000 for sewage works.

THE Public Works Loan Commissioners have been asked for a loan of £36,000 to carry out the Aber Valleys sewerage scheme at Rhymney.

A LOCAL Government Board inquiry was held at Ilford on Thursday, the 3rd inst., into the application of the Urban District Council for permission to borrow £1660 for sewerage works.

THE Crieff Town Council has resolved to borrow £500 for defraying the expense of the improved drainage system in the lower part of the town.

THE Surveyor to the Dunstable Council has presented his report (with plan) on the Luton-road site for the proposed sewerage scheme by gravitation.

THE Tavistock Council has agreed to adopt a drainage scheme for the drainage of certain houses on the Whitchurch-road, and to borrow £300 to carry out the work.

THE Wendover Rural District Council has decided to petition the Thames Conservators to grant a further extension of two years before carrying out a system of drainage at Wendover.

A LOCAL Government Board inquiry has been held at Wickwar with regard to the proposal of the Rural District Council to borrow £500 for purposes of sewerage and sewage disposal for the parish.

AT a recent meeting of the Gomersal Urban District Council minutes were confirmed of a special meeting at which plans of the drainage scheme had been formally approved, and at which the clerk had been directed to apply to the Local Government Board for sanction to borrow £8000 for carrying out the work.

THE tender of Messrs. Walker and Co., of Keighley, for the sewerage of Morton, amounting to £4141 6s., has been accepted. Only a portion of the work is to be done at present, that from Morton village to Dimples, and from Morton Banks to the Marquis of Granby Inn. The amount of the tender for these sections is £2338 9s. 9d.

THE Brynmaur Urban District Council has decided to apply to the Local Government Board for sanction to borrow £2500 for the purchase of the Rhonos Farm, and costs to the Council, attending sale andconveyance of the farm together with the expense of improving the works needed for distributing more effectually the sewage.

A SPECIAL meeting of the Shaftesbury Town Council was held recently to receive a report from the Borough Surveyor with reference to the drainage at Ivy Cross. Mr. W. Genge reported that the drain which was laid down about a year ago to connect the houses at Ivy Cross with the main drainage of the town in Bleke-street was choked. This was caused by the improper manner in which the pipes had been laid, which for eighty-seven yards after leaving the top of Dark-lane going in the direction of the town had a reverse fall. The surveyor was instructed to take up the pipes and have them relaid in a proper manner, and give a fall of 2in. in 10ft.

MR. C. B. WITTS, C.E., of Cheltenham, met the Sewerage Committee of Burford on Tuesday, the 1st inst., concerning the proposed scheme of disposing of the sewage matter of the town of Burford. Objections having been made by the District Council to the plans which Mr. Witts had submitted, it was decided that he should prepare another scheme with a view to meet any opposition from the Local Government Board.

IN consequence of the repeated complaints received by the Ilkeston Town Council from the people of Hallam Fields as to an alleged nuisance arising from the sewage farm at that place, the Town Council paid a special visit to the farm on Wednesday, the 2nd inst., and received a deputation appointed by a recent meeting of the inhabitants. The state of things was found to largely confirm the previous reports of the Health Committee—that no nuisance existed.

Mr. W. J. DIBDIN has just presented a further report to members of the Leeds Streets and Sewerage Committee in reference to the experimental purification of the sewage of Leeds by the bacteriological method. The committee, on Tuesday, the 1st inst., drove to the works at Knostrop, and there met Mr. Dibdin, who explained the practical working of his system. The operations comprise first, the preliminary breaking down of complex organic bodies and the liquefying of the solids suspended in the sewage, this being effected by the agency of micro-organisms in a bacteria bed filled with coarse coke; and, secondly, the final oxidation, coupled with a complete removal of the remaining suspended matters, by similar action in a bed of finer grain. If it is found possible to extend the system, a considerable outlay in the purchase of land and the erection of sewerage works will be saved the ratepayers of Leeds.

A NUMBER of representatives of local bodies visited Pleasley on Wednesday, the 2nd inst., to inspect works which have just been completed at Shirebrook and Pleasley, in the Blackwell Rural District, at a cost of about £6000. At Shirebrook, where the inspection began, the series of tanks is in a rectangular form. A number of chambers are built of stone and concrete, the first chamber, which receives the sewage after it has been subjected to the precipitating action of chemicals, being about twice the size of the others. The greatest proportion of solid matter is precipitated in the first chamber, the precipitation becoming less in quantity as it passes gently through the other chambers, until at the bottom of the last there is very little solid matter to be found at all. The clearness of the water at the effluent, of which several samples were taken, showed that the treatment of the sewage had been adequate and successful. The system is that invented by Mr. Cosham, of Newark. The party next proceeded to Pleasley, where works on the same principle had been constructed, excepting that, instead of rectangular, the chambers are in a circular form. The plans of the works were prepared by Mr. Walker, engineer, of Nottingham, and the contracts have been satisfactorily carried out by Messrs. Lane and Son, of Skegby.

AT the last monthly meeting of the Ludlow Town Council the present system of sewage disposal was reported to be very bad and thoroughly inefficient. The tanks were objectionable, and the effluent passed into the river chemically untreated in any way. The system constituted a grave violation of the Rivers Pollution Act. The Sanitary Committee reported that the time had arrived when the sewage disposal scheme should be proceeded with. The cost will probably be between £7000 and £8000.

AMONG the large undertakings of the Public Works Department of Australia is the Sydney sewerage system, which, in its present complete form, is of comparatively recent date, the works having been only commenced in 1880. Briefly described, the works consists of a main northern outfall sewer, which collects the sewage of the portion of Sydney and suburbs which naturally drains into Port Jackson, and discharges into the Pacific Ocean at a point about five miles to the south of Sydney Heads. The sewage of the southern district is collected into a separate system and conveyed to a sewage farm on the shores of Botany Bay. The scheme also comprises a system for the western suburbs, which also discharges on to the sewage farm at Botany. In addition to the extensive reticulation works in connection with the main scheme, numerous storm-water drains have been constructed where foul and insanitary creeks formerly existed. The amount expended on these works up to June 30th, 1896 was £1,920,008, including a small expenditure on country sewerage. The effect which the construction of the sewers has had upon the health of Sydney has been most marked.

WITH reference to a paragraph appearing under this heading in our issue of January 21st, dealing with the working of the Cleckheaton sewerage works, a correspondent writes:—"I shall be obliged if you will kindly give the facts of the case, which are as follows:—The district of the Cleckheaton District Council embraces the hamlets of Scholes and Oakenshaw, in addition to Cleckheaton proper, and in the year 1889 the late Local Board carried out a scheme of sewerage and sewage disposal for the Scholes portion of their district, which works were designed and carried out by Mr. Woodhead, Surveyor of Bradford, and during some portion of last year (through the alleged negligence on the part of some person who had the management of this sewage farm) the Rivers Board Inspector complained of the impure state of the effluent, and the Council have now decided to call in Mr. Woodhead (as the designer of the scheme) to advise them as to remedying the complaint. I may say that the new sewerage scheme, which is being carried out for the township of Cleckheaton proper has been designed by Mr. J. C. Haller, A.M.I.C.E., on the latest and most approved system, and is giving entire satisfaction to all parties concerned. The whole of the Cleckheaton sewers are connected into the Liversedge District Council's main trunk sewer, and the sewage is being treated at the Liversedge sewage disposal works by that Authority under contract with the Cleckheaton Council."

A PUBLIC meeting was held in Bourne Hall, Douglas, on Wednesday night, the 2nd inst., called with the intention of overthrowing the scheme of drainage which the Corporation has embarked upon, in favour of drainage by natural gravitation. The scheme in progress embraces what are known as Adam's automatic lifts, to be used for lifting the sewerage from a lower to a higher level, and prevent back-flowing in the seaward portion of the town. A resolution was carried approving the substitution of the scheme of gravitation, and a deputation was appointed to give evidence before the Tynwald Court Committee in favour of this scheme, which has been once adopted by the Town Commissioners, the estimated cost being £30,000. It was stated that the present scheme would not be completed under £80,000.

Lighting.

THE directors of the Rothbury Gas Company have decided to reduce the price of gas from 5s. to 4s. 7d. per thousand feet.

THE Law and Finance Committee of Greenock Town Council has under consideration the question of introducing electric light into the town.

A LOCAL Government Board inquiry has been held at Cardiff in connection with an application for sanction to borrow £29,500 for the purposes of electric lighting.

THE City Engineer for Newcastle has been instructed to furnish a report as to the amount of power capable of being produced from the waste energy of the Byker refuse destructor.

THE Local Government Board has intimated to the Dublin Corporation that it will grant to that body a loan of £20,000 to be applied in repairing and completing the electric lighting system of the city.

A LOCAL Government Board inquiry has been held at Walsall with reference to an application by the Town Council for permission to borrow £700 for increase of the engine-room power of the electric lighting plant.

A COURT of Inquiry was held at Broughty Ferry recently regarding an application to the Secretary for Scotland for a Provisional Order to enable the Burgh Commissioners to ask additional borrowing powers for the extension of the gas works.

THROUGH the efforts of the Currie Lighting Committee, a great public improvement has just been carried out by the extension of the Edinburgh gas to Currie. The work of laying the gas main has been in progress during the past two months. An arrangement has been made with the Edinburgh Gas Corporation for the sale of the gas in bulk to the Local Committee, who undertake the management and distribution.

THE Hampstead Vestry has decided to apply for a loan of £40,000 from the London County Council in order to pay for some very extensive plant for electric lighting it has just added to the central station in Finchley-road. The St. Pancras Vestry is at work extending its installation to meet that of Hampstead, at Chalk Farm, and as a result one straight road, reaching almost from Oxford-street to Hampstead Heath, will be illuminated by the electric arc light.

A SUCCESSFUL installation of electric light has lately been completed in Treeton by Messrs. J. Dewhurst and Son, Limited, of Sheffield. The contract for the work was £600, but owing to the requirements of the Board of Trade this estimate has been exceeded by £140. It has been resolved to obtain the sanction of the County Council and Local Government Board to this sum, and to raise the sum of £210 for lighting purposes under the Lighting and Watching Act, 1833, during the ensuing year.

THE Electric Lighting Committee of the Shoreditch Vestry recommends, that owing to the success of the Vestry's efforts in the combined scheme of the generation of electricity from the steam supplied by the dust destructor, the Vestry reduce the charge for electricity from 6d. per unit for the first two hours, and 4d. per unit for the surplus, to 6d. per unit for the first hour and a-half, and 2d. per unit afterwards. The Vestry has resolved to defer the Committee's recommendations till after the financial year's statement in March.

AT a recent meeting of the Southgate Urban District Council, a letter was received from the solicitors of the Tottenham and Edmonton Gas Company enclosing a copy of a clause the company were willing to insert in the Bill as to illuminating power and purity of gas. The Council eventually decided to petition against the Company's Bill. It was mentioned that the Company had lighting powers over less than half the district, and that the powers sought to supply electric light within the district would consequently not apply to the larger half thereof now lighted by the Colney Hatch Gas Company.

MESSRS. YOUNG AND MARTEN'S DINNER.

THE fourth annual dinner of the heads of staff of the firm of Young and Marten, Caledonian Works, Stratford, took place at the Holborn Restaurant on Saturday, 29th ult., with Mr. H. H. Marten, proprietor, in the chair, and Mr. E. Montague Edwards, general manager, in the vice-chair, Mr. Frank Marten and Mr. Ernest Marten were also present.

The first toast was that of "The Queen," which was submitted by the Chairman and duly honoured.

Mr. E. M. EDWARDS, vice-chairman, stated, in proposing the health of "The Proprietor of the Business, and Success to the Firm of Young and Marten," that it was the toast of the evening, and he regarded it as an honour that he was privileged to propose it. He spoke of the achieve-

ments of the firm, and the name they had gained through supplying goods of sterling value at a nominal figure, and with promptitude and dispatch. They had gained a position in the building world which was envied by many. The future success of the firm, he felt, was assured; the catalogue just completed and now being distributed amongst the firm's *clientèle* he considered, without speaking egotistically, was one of the finest and most comprehensive that had ever been attempted; eulogies from all parts were flowing in to headquarters, and the trade Press had spoken most encouragingly of it. The new stores, for which the contract had just been accepted, would cover a stocking area of four times the firm's present capacity, and would enable it to hold a large increased stock, a very essential item in ensuring one of the points always fought for by the firm, that was promptitude. The shipping department, though yet in its infancy, began to grow, and if properly nurtured would stand on its own merits, as every department of the business did.

The CHAIRMAN, in response, said: I have once again to thank you, Mr. Edwards, for the kind remarks you have made in proposing my health, and also for the eulogistic expressions you have used in reference to the firm of Young and Marten, of which I have the honour to be the proprietor. I think these annual dinners are a splendid institution, from two or three points of view. There is the social and commercial aspect, and, if I might say so, the expedient point of view. I think it is expedient and desirable that we should meet here once a year, not only to enjoy a social evening, but also to interchange ideas with regard to the progress of the business. But with regard to the commercial aspect, last year I expressed the hope that 1897 would be a record year, and I am glad to say the volume of trade done justifies that hope, as we had a considerable increase in our turnover. There is one feature of 1897 that will stamp it for ever in the annals and history of the firm, and that is the production of the new catalogue. I propose to speak of this later on, so I will content myself now by saying the work will place us in the foremost rank of the trade as builders' merchants. I have no doubt that 1898 will be considerably benefited by it, and as the outlook for this year is more promising than last, I feel sure, with your assistance, gentlemen, we shall have at our next meeting successful issues to relate. Now, with regard to the social question, I am only too pleased to preside here to-night, and spend a pleasant evening with you. I am glad to see the old faces, and welcome the two or three fresh ones. I am sure if they follow in the footsteps of you gentlemen that have been in the employ of the firm for many years, the prosperity of the future business of Young and Marten is assured.

The CHAIRMAN, in submitting the toast of "General Manager and Staff," said: I have now to propose what I consider is the toast of the evening, that is, the health of your worthy vice-chairman and manager, Mr. Edwards, and the staff of Young and Marten. Gentlemen, each year as it passes away adds, if possible, to the pleasure I feel in proposing this toast, as each year helps to cement more and more the feeling o unity and loyalty that exists between the staff and myself. With regard to our worthy vice-chairman, he needs no eulogy from me, as his well-known ability and indomitable energy speak for themselves, but I cannot allow this evening to pass over without paying him a tribute of praise with regard to our new catalogue, a commendation in which I am sure you will all join; he has worked incessantly in the production of the book for four or five years, and the result must be not only gratifying to him, but to all you gentlemen concerned who have assisted in its production. With regard to yourselves, gentlemen, how can I fail to be proud of such a staff? No general in the Army could possibly have a more energetic and loyal body of men than I see around me this evening. I thank you most heartily for all your services; and I rejoice to think the same unity of spirit, respect, and esteem still exist between us.

The VICE-CHAIRMAN, in replying, said that he appreciated, on his own behalf, the kind words of encouragement which had fallen from the lips of Mr. Marten. He felt also that the staff would in a like sense appreciate them. Mr. Marten was at all times liberal in the treatment of difficulties. With regard to the catalogue, the speaker stated that although he bore the full onus of its compilation and completion, nevertheless there were those present who had materially assisted him, and to them credit was due; therefore the honours were distributed, although not specifically named.

Mr. FRANK MARTEN proposed the health of the "Dinner Committee." Mr. S. A. STOOKE, in responding, said the greater portion of the work and arrangements had fallen upon Mr. R. Letby, to whom great praise was due.

A capital musical programme was arranged by the Musical Committee, which was much appreciated.

Notes and Queries.

[Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C.]

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

959.—MODEL BYE-LAWS: NECESSITY FOR ADOPTION OF.—"G. F. C." writes:—"My Rural District Council will next week decide whether to adopt the Model Bye-laws as to New Streets and Buildings. After over twelve months' discussion, we seem likely to lose them. As I shall be called upon to support the proposition for new bye-laws, I shall be extremely glad if you could give me information by way of replies to the following queries:—(1) Are these bye-laws being generally adopted by Rural District Councils? (2) If adopted, are they proving a success? (3) Are the bye-laws likely to deter people from building new cottages in rural districts? (4) Does the term new building apply to improvements in old houses? (5) Or does it affect the erection of additional privies where, say, only one formerly existed for a row of four cottages? (6) Do you approve of them?"

Answer.—(1) Bye-laws as to New Streets and Buildings are adopted by most of the Urban and Rural Sanitary Authorities in the kingdom, the exception being in the case of retrograde Authorities who have yet to learn that they are responsible for the sanitary administration of their district, and to see that new dwellings are

not erected which contravene the rules of sanitary construction of dwelling-houses. (2) Yes. In securing more healthy homes, and ensuring that the health of the occupants is a prior consideration to the monetary interests of the speculative builder. (3) No. This is a "bogey"—if we may be pardoned for using the term—which is put forward in every district when a Sanitary Authority proposes to adopt the Bye-laws as to New Buildings, and is created by the speculative builder or his friends. We have never known building bye-laws deter people from building. We cannot advert too strongly on the importance of Sanitary Authorities being impressed with the fact that their duty is to protect the health of the people, and not to protect the pockets of speculators, who are too often regardless of the sanitary condition of the buildings they erect when not officially supervised. (4) Very rarely. (5) The erection of privies under such circumstances would have to be in accordance with the provisions of the New Bye-laws as to Construction, &c. (6) Most certainly. We hope the day is not far distant when building bye-laws will be compulsory in every district.

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960. Removal of House Refuse from Premises: Neglect of Local Authority: Nuisance from Fowl Keeping.—"E. J." writes:—"(1) A notice has been served on a Sanitary Inspector to cause ashpits to be emptied. Within what time is he bound to have the work done? Please state section of the Act. (2) Would it be considered a nuisance to keep, say, fifteen or twenty fowls within 16ft. or 18ft. from a dwelling-house to the fowl-pen, and to throw vegetables, bones, meat, raw and cooked, into the fowl-yard, which is 25ft. or 30ft. from the dwelling-house? Sparrows and starlings collect in scores in the yard after the meat. Sometimes very offensive smells come from the yard."

Answer.—(1) It is not stated whether the Local Authority have undertaken or contracted for the removal of house refuse. Providing that they have undertaken the removal of such refuse, and after notice in writing from the occupier of any house within their district to remove the contents of any ashpit, the Authority fail without reasonable excuse to carry out the work within seven days, they will be liable to a penalty of 5s. per day for each day in default. See Sec. 43 Public Health Act, 1875. Proceedings for the recovery of the penalty would have to be instituted under Sec. 251 of the Act. (2) If the manner in which the fowls are kept is such as to constitute the premises a nuisance, or so as to be injurious to health, as defined by Sec. 91, Sub-sec. 1 of the Public Health Act, 1875, information may be given to the Local Authority, as provided by Sec. 93, upon the receipt of which information the Local Authority, if satisfied of the existence of a nuisance, may serve a notice under Sec. 94 on the person by whose act, default, or sufferance the nuisance arises, or continues requiring him to abate the nuisance, and on his default they may make complaint to a justice requiring him to appear before a court of summary jurisdiction, which court may make an order dealing with the nuisance. We are unable with the information before us to express an opinion as to whether the keeping of the fowls will constitute a nuisance. Our correspondent should lay a complaint to the Local Authority, when they would no doubt institute proceedings against the person in default if necessary.

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961.—Ventilation and Cubic Space: Calculation for.—"J. G. S." writes:—"A room 9ft. high, 20ft. long, and 10ft. broad contains six persons. The ventilating inlets, four in number, have a total area of one square foot. With what velocity per minute will the air have to enter through the inlets to supply 3000 cubic feet per head per hour? Would the conditions given be satisfactory for a dormitory or sleeping room?"

Answer.—A total quantity of 18,000 cubic feet of air would be required to enter the room per hour in order to supply each of the six persons with 3000 cubic feet. As this amount would have to pass through an area of one square foot, the velocity of the air in feet per minute will be $\frac{18{,}000}{1 \times 60} = 300$ft.

To determine whether the conditions given would be satisfactory for a dormitory or sleeping room, it will first be necessary to obtain the cubic capacity of the room and divide this by the number of persons occupying the room, afterwards comparing the result with the figures of cubic space usually allowed to be necessary.

9ft. × 20ft. × 10ft. = 1800 cubic feet, and $\frac{1800}{6} =$ 300 cubic feet of space per head.

Theoretically 1000 cubic feet of space is necessary per head, the air being changed three times per hour, so that the CO_2 may be kept below the limit of ·06 per cent., but 300 cubic feet is the amount allowed in common lodging houses. To keep the CO_2 below the limit of ·06 per cent. in this case the air of the room would have to be changed ten times per hour $\left(\frac{18{,}000}{1800}\right)$, which could not be done without a serious draught to the occupants of the room. It would appear from this that the conditions of ventilation and space available are not satisfactory for the occupation of the room by six persons.

962.—Storm-water Sewer: Power to Lay through Private Lands.—"L. F." writes:—"We are carrying out certain private street works on default of the owners,

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of which the laying of surface-water sewers is part. There is one street which, owing to inadequate fall, I cannot connect to the other, but I could drain it into a watercourse if I could get permission to take the sewer through a small private garden which lies between the street and the watercourse. Can you inform me if the Council can compel the owner to allow it, whether he consents or not, and also state whether we should pay a small quit rent? I believe quit rents for sewers in rural districts are not allowed."

Answer.—It is provided by Sec. 16 of the Public Health Act, 1875, that any Local Authority may carry any sewer through, across, or under any road, street, &c., and after giving reasonable notice in writing to the owner or occupier (if on the report of the surveyor it appears necessary) into, through, or under any lands whatsoever, within their district. Providing, therefore, the surveyor reports to his Authority the necessity of passing through the land named by our correspondent, and that reasonable notice is given to the owner or occupier, we are of opinion that they may carry out the work proposed. The Local Authority may be required to compensate the owner and occupier for any damages sustained, but they cannot be required to pay any way-leave rent. Attention may also be directed to the provisions of Sec. 67 of the Highway Act, 1835, which enact that "the surveyor shall have power to make, scour, cleanse, and keep open all ditches, gutters, drains, or watercourses, and also to make and lay such trenches, tunnels, plats, or bridges, as he shall deem necessary *in and through any lands adjoining or lying near to any highway*, upon paying the owner or occupier of such lands or grounds, provided they are not waste or common, for the damages which he shall sustain thereby, to be settled and paid in such manner as the damages for setting materials in enclosed lands or grounds are herein directed to be settled and paid."

963.—SANITARY CONVENIENCES USED IN COMMON: PROCEDURE IN CASE OF DEFAULT. — "Inspector" writes:—"This is an urban district, wherein bye-laws are in force requiring occupiers to clean out their own ashpits. It is customary for farmers to clean out and remove the ashpit refuse, each occupier paying from 6d. to 1s. each. In case of a joint ashpit used in common by several occupiers, and one of the occupiers refuses to pay his proportion, could any occupier get the ashpit emptied, pay for those who refused, and successfully sue the joint occupiers for payment of their share of cost of removal of ashpit refuse?"

Answer.—Unless it can be shown that there was an agreement or arrangement on the part of all the occupiers to pay their respective shares for work done on the order of one of the parties, we are of opinion that the expenses incurred cannot be recovered. In such cases the Sanitary Inspector may render effective assistance by serving the statutory notice to cleanse the ashpit upon the person or persons who are in the practice of refusing to pay their proportionate expenses, and in case of default the Local Authority should institute legal proceedings against them as representing the joint occupiers. If Part 3 of the Public Health Acts Amendment Act, 1890, has been adopted in the district, the Sanitary Authority, in addition to the powers contained in the bye-laws, may, under Sec. 21, Sub-sec. 2, proceed against such of the persons having the use of the sanitary convenience in common as may be in default for permitting the sanitary convenience to be in such a state or condition as to be a nuisance or annoyance to any inhabitant of the district for want of the proper cleansing thereof. The term "sanitary convenience," it may be noted, includes, as defined by Sec. 11, Sub-sec. 3, "ashpits."

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EDINBURGH.—February 16th.—Sewer.—The Burgh Engineer, 1, Parliament-square.

HAM (SURREY).—February 16th.—Sewerage Works.—Colonel Seddon, engineer, 27, Bow-lane, London, E.C.

HOVE (SUSSEX).—February 16th.—Drain Pipes, &c.—Mr. H. H. Scott, Town Hall, Hove.

KING'S NORTON (BIRMINGHAM).—February 16th.—Sewer, &c.—Mr. A. W. Cross, C.E., engineer and surveyor, 23, Valentine-road, King's Heath.

NEWBOLD VERDON (NEAR MARKET BOSWORTH).—February 16th.—Drain.—Mr. W. M. Sykes, surveyor, Park-street, Market Bosworth.

SNEINTON (NOTTS).—February 16th.—Sewers, &c.—Messrs. W. and R. and F. Booker, Short-hill, Hollow-stone, Nottingham.

CHEADLE (STAFFS).—February 16th.—Sewer, &c.—Mr. F. T. Inskip, Surveyor, Brook House, Cheadle.

TIPPERARY.—February 14th.—Sanitary Works.—Mr. Joseph Gubbins, clerk, Workhouse, Tipperary.

BURNLEY. — February 16th. — Mr. S. Edmondson, district surveyor, 18, Nicholas-street, Burnley.

UXBRIDGE. — February 18th. — Sewers.—Mr. John Anstie, C.E., Engineer, 17, Victoria-street, Westminster.

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CLERK of WORKS (LONDON, N., February 15th.)—For the Tottenham Urban District Council. Salary £2 10 per week. Mr. P. E. Murphy, engineer to the Council, 712, High-road, Tottenham, N.

CLERK OF WORKS, (LONDON, E.C., February 17th.)—For the Vestry of Shoreditch. Salary £3 3s. per week. Mr. H. Mansfield Robinson, clerk, Town Hall, Old-street, E.

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JOSEPH CARLESS,
Town Clerk.

Town Clerk's Office, Hereford,
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THE

Sanitary Record,

FEBRUARY 18, 1898.

Notes.

ON the opening of Parliament sanitarians scan with interest the list of measures that bear on those subjects with which they are concerned. The list this year is not a great one, but it includes several of considerable importance. First on the list comes the promised Local Government Bill for Ireland, from which, apart from political considerations, great things are expected. Then a foremost place in the Government programme is accorded to the "measure for facilitating the creation of municipalities in the administrative county of London." A Bill for the Amendment of the Vaccination Law is also promised for this session; following, it is to be supposed, on the lines of the recommendations of the Royal Commission. These are to be the leading measures. A number of others are promised, "should time permit;" but with a weighty programme like that which the Government have in hand, the prospects of these are not very bright. The list of minor measures includes a Bill for the Prevention of the Adulteration of Drugs and Food. What the chances are of the ill-fated Plumbers' Registration Bill it would be unwise in the meantime to attempt to predict. We have also to note Mr. Chaplin's statement that the report of the Tuberculosis Commission is at present under consideration, and may be looked for shortly.

THE Queen's Speech makes sympathetic reference to the recurrence of the plague in Western India, the alarming ravages of which are causing considerable anxiety. The death-rate is steadily rising. According to a Reuter's telegram of 10th inst., the mortality returns showed 1113 deaths from plague in Bombay during the preceding week, or an increase of 20 per cent. on the returns for the previous week. The total death-rate was 129 21 per 1000 of the inhabitants. The plague is also spreading alarmingly in the dominions of the Nizam of Hyderabad. In the Queen's Speech it is stated that the mortality is less alarming than it was at this time last year, though sufficiently so to give those in power an anxious time. No effort will be spared by the Government in the endeavour both to limit the extent of the disease and to mitigate its effects.

INFLUENZA has evidently come to stay. Every winter it lays its indiscriminating hand on the rich and the poor, the humble and the illustrious, alike. Truly it knows no distinction of persons. This year it has been particularly severe, especially in the metropolis and the southern counties, and many eminent victims have been claimed by the scourge. In London during the last week of January the number of deaths from influenza was eighty-eight, the highest number recorded in any week since March, 1895. The weather has been open and mild to an extraordinary degree, but that has not aided us in warding off the attacks of this insidious disease. Perhaps, indeed, the unseasonableness of the climatic conditions this winter may have had something to do with the prevalence of the malady. We hear that in Paris the doctors, in their anxiety for the public health and to eliminate every possible cause of sickness, have presented a petition to the Prefect of Police to suppress the queue outside the theatre doors; for they believe, and no doubt rightly, that there is no more fruitful cause of cold and influenza and all their attendant ills. To stand patiently waiting outside a theatre door in a cold wet evening is certainly laying one's self open to the risk of catching one's death of cold, but the practice springs from a deep-seated desire in human nature, which the faculty will find it hard to eradicate.

In an article in the *British Medical Journal* the writer points out that there are now recognised three distinct types of influenza—affecting the respiratory organs, the nervous system, and the digestive organisation respectively. The epidemics with which we have been visited in recent years have been of all three types in succession, in the order we have mentioned, and that which is prevalent just now belongs to the third type. "The symptoms," says the writer, "are in many cases so severe and pronounced that the most experienced physicians have in individual cases felt some hesitation for several days in rejecting the diagnosis of typhoid fever." And he goes on to illustrate his point by the fact that in London, while influenza is on the increase, diseases of the respiratory organs are diminishing. It will be remembered, in connection with the Warwickshire epidemic, that while the general belief, shared in by many of the local doctors, was that the symptoms showed such derangement of the digestive organs as to point to poisoning, the Medical Superintendent of the Asylum adhered to his opinion that the outbreak should be characterised as a type of influenza.

Notwithstanding the serious epidemics of influenza which have prevailed during recent years, it is satisfactory to observe that the total death-rate for 1897 was only 17·4 per 1000, according to the returns of the Registrar-General for England and Wales. This, with the exception of the years 1894 and 1896, is the lowest death-rate on record since the establishment of civil registration in 1837. By a singular coincidence the birth-rate, which has shown an almost continuous decline for the past twenty years, was also last year the lowest since 1837, with the exception of the same two years, the rate for England and Wales being 29·7 per 1000 of the population, which is estimated at rather more than 31 millions of persons. Of the total deaths registered for England and Wales in 1897, twenty-five were attributable to small-pox, 12,456 to measles, 4492 to scarlet fever, 7461 to diphtheria, 10,887 to whooping cough, 4873 to fever (principally typhoid), and 26,857 to diarrhœa. The deaths from these principal zymotic diseases were thus in all 67,051, giving a death-rate of 2·15 per 1000. The decline in the number of deaths from small-pox is very striking. During the past five years the deaths from this cause have ranged from 223 to 1457, so that a decline to twenty-five is a result which is most satisfactory. Of these, sixteen were in London, and nine in the rest of the country.

Satisfactory as these results are, it is not satisfactory to note that an epidemic of small-pox has broken out at Middlesbrough, and that the disease is spreading to an alarming extent. The public vaccinator has been ordered to make a house-to-house visitation, and to vaccinate the inhabitants free of charge, for which purpose the services of three doctors have been retained. It has also been decided to close the lending departments of the free libraries and the lending library of the Literary and Philosophical Society. In presenting the report of the Public Health Committee of Edinburgh Corporation, the Convener, Bailie Pollard, took occasion the other day to comment on this outbreak, and to congratulate the people of Edinburgh on their comparative immunity from this scourge. He observed that they were quite prepared for any moderate outbreak of the disease, but he thought it well to remind the people that they did not need to have small-pox unless they wished it. The experience of the epidemic in Edinburgh four years ago, he said, had undoubtedly been that no person who had been properly vaccinated would take small-pox within seven years. The period of immunity in the case of young children is now thought to be somewhat less than this, but it is a wholesome standard on the average, and should be rigorously enforced on the least suspicion of an outbreak.

After an exhaustive investigation extending over eight days, the Local Government Board inquiry into the origin of the epidemic of typhoid at Maidstone was brought to a close last week. The Inspectors will doubtless present their report to the Local Government Board as soon as possible, but some time must necessarily elapse before it will be placed in the hands of the public. Meanwhile it is a matter for congratulation that the inquiry has been so thorough, and we think there can be little reasonable room for doubt as to the prime cause of the outbreak. The water company made resolute attempts to fix the responsibility on the drainage system, and they certainly succeeded in establishing the fact that it was hopelessly bad. It was shown that fully two-thirds of the houses in the town have for a long time past had no water laid into the closets, which were simply hand-flushed; and though the Sanitary Authority about four years ago began to attempt to reform this state of things, they showed so little energy in their enterprise that at the time of the outbreak no less than half the houses in Maidstone still possessed unflushed drains. Matters are proceeding differently now, no doubt, and the Sanitary Staff are pushing on the work of reform as fast as possible, but that is only after all the mischief has been done.

The drainage system of Maidstone has certainly been proved to have been wofully defective, but the weight of the evidence has shown that the real cause of the outbreak does not lie there. The testimony of the experts was almost unanimous in assigning the origin to the Farleigh water supply. It is true that the typhoid bacillus was not actually detected, but it was pointed out that this was hardly to be expected, as it is a thing most difficult to discover. On the other hand, the area of the epidemic coincided with the area of the water supply; a particular spring, which was found to be liable to pollution from fæcal matter, was proved on examination to be actually so polluted, and on cutting off the suspected source a marked improvement immediately followed. So much for the water company. But what will be thought of the policy of the Town Council, who totally neglected to have monthly analyses of the water taken? By this failure in their plain duty they imagined they were saving £40 a year, when in reality they were laying themselves open to the risk and the responsibility of a loss of £50,000, which, on a moderate estimate may be considered to have

been the cost to the community of this most lamentable epidemic.

Whatever may be thought of the prime cause of the outbreak, the Town Council have not shown up well in this inquiry. From motives of economy, it is to be supposed, they declined to engage the assistance of counsel, or to call expert evidence, and this because the Local Government Board, according to its regular practice, would not beforehand promise its sanction to this expenditure out of public money, though Mr. Davey stated that after the inquiry was over no doubt all legitimate expenses would be sanctioned. The inquiry was certainly non-judicial, but when counsel are engaged at all, it is better that all parties be equally represented, both in the interests of fairness in the examination of the witnesses, and out of regard to the time of the Court. The holding of a public inquiry, which was a departure from the usual course, has been abundantly justified by the result, for the facts have been ascertained with a fulness that could have been attained in no other way. And the chief lessons to be drawn from the investigation are the necessity for the strictest protection and supervision of all sources of water supply, and the paramount duty that rests upon the Sanitary Authority of making regular inspections and analyses of the water.

One result of the inquiry will undoubtedly be the arousing of public opinion, not only in Maidstone, but all over the country, to the importance of these lessons, as well as to the supreme importance of the establishment of a sound sanitary *régime* in every department. It will be realised by the ratepayers that money so spent is well spent. Sanitary Officers who are alive to their responsibilities do not need to have this elementary truth brought home to them, but those who hold the public purse-strings are often slow to view matters in the same light. There can be no more effective teacher, however, than a great public calamity, such as the Maidstone epidemic, and the light which has been thrown upon it by the Local Government Board inquiry. A Medical Officer may waste his breath for years in denouncing abuses which no one heeds, but the forcible instruction which is conveyed by a disastrous epidemic will make people see, as nothing else could do, the wisdom of his warnings.

Dr. Simpson, Professor of Medical Jurisprudence in Glasgow University, after occupying the chair for a quarter of a century, has retired, and the University Court is in some doubt as to the course that should be adopted in the appointment of his successor. By the constitution of the chair, the teaching of Medical Jurisprudence is to be associated with that of Public Health, and at the time when the chair was founded, early in the present century, this arrangement was possible and convenient. It is no longer so, however. Public health is now a subject of great and growing importance. In other Universities special provisions for its teaching are made, and diplomas in public health are granted, which have come to be recognised as valuable qualifications in Medical Officers. The subject demands a chair to itself. According to the present practice, the consequence of the association of the two subjects is that the more important subject is completely overshadowed by one whose utility is felt by only a very limited class. A generation ago that was no doubt in accordance with the fitness of things, for then public health had not risen to the position of supreme importance that it now occupies, but now that the position is reversed, it is felt that this opportunity should be taken to put matters on a true footing.

The difficulty is that an Act of Parliament is probably required to effect the change. It is felt to be a pity that the University Commission has not left it in the power of the University Court to separate the two subjects. Opinion in University circles is somewhat divided on the point, but the trend of opinion is that the requirements of Medical Jurisprudence would be amply satisfied by the appointment of a lecturer, who should be a man actively connected with the Courts; and that a Chair of Public Health should now be founded, whose occupant would be enabled to devote his whole time to his special subject, and particularly to work in the laboratory. The matter rests with Lord Balfour of Burleigh, the Secretary for Scotland. There is a widespread feeling that it would be well that he should delay making any permanent appointment until opinion on the subject has sufficiently matured, and to give those who are in favour of the foundation of a Chair of Public Health an opportunity to raise the necessary funds. It is quite imperative that in a leading medical school like that of Glasgow such a chair must be established before long, and it would be a thousand pities if by too precipitate action the present opportunity were to be lost.

An interesting case of unsound meat exposed for sale in a butcher's shop was recently decided by the magistrates of Alfreton. It appears that on the 11th January the Inspector of Nuisances of the Alfreton Urban District Council seized seven pieces of meat and one piece of sausage which it was alleged were unfit for human consumption. They were exposed in a butcher's shop belonging to the Ripley Co-operative Society, Limited. The seizure and subsequent condemnation by the magistrates appear to have been properly carried out under the provisions of Sections 116 and 117 of the Public Health Act, 1875, under which it is provided that a "Medical Officer of Health or Inspector of Nuisances may at all reasonable times inspect and examine any animal, carcase, meat, &c., exposed for sale, or deposited in any place for the purpose of sale, or of preparation for sale, and intended for the food of man, the proof that the same was not exposed or deposited for any such purpose or was not intended for the food of man resting with the party charged." It is further provided that the Justice may, if it appears to him that such meat, is diseased, condemn the same, and order it to be destroyed. Moreover, the person to whom the said meat belonged is adjudged liable to a penalty not exceeding £20 for every piece of meat, &c., so condemned.

There was put forward on behalf of the Society the customary plea that the meat was not intended

for sale for human food, but that it was sold for pigs or intended for sale for pigs. We confess we have some difficulty in comprehending how meat intended for the four-footed animals could be exposed for sale in a sale shop with meat avowedly intended for the food of man. If such a plea were to be held good by any other magistrates than those of Alfreton—for the case was dismissed—we should be sorry for the health and lives of the poorer classes in our towns for whom the provisions of the sections we have referred to were intended, as they need to be protected against the iniquity of meat being sold to them which is only fit for pigs, and which may produce disease and death. The Alfreton Council are, however, to be commended for their action in instituting — as guardians of the public health—the prosecution, and although the same failed through no fault of theirs, the effect cannot but be productive of good to the health and lives of the community of their particular district, as the prosecution will act as a warning to purveyors of food generally to exercise the utmost care in conducting their business on proper and legitimate methods.

NOTES ON
PRACTICAL SANITARY SCIENCE.

By WILLIAM H. MAXWELL.

Assistant Engineer and Surveyor, Leyton Urban District Council, Author of "Drainage Work and Sanitary Fittings," "Ventilation, Heating, and Lighting," &c., Certificates of the Association of Municipal and County Engineers, and Sanitary Institute.

No. 49.—REFUSE DESTRUCTORS.

(Continued from page 139.)

"Acme" Destructor.

The "Acme" refuse destructor[128] is the patent of Messrs. Hart and Royle, of Stretford, Manchester. Its general arrangement differs materially from those previously described, as will be observed from the accompanying Figs. 13 and 14. The working of this destructor is as follows:—The material to be burnt being placed in the hopper A gradually falls into the furnace B on the sloping bars, and after loss of its combustible matter, slides down into the ashpit I, from whence it can be removed at convenient intervals by means of a proper shovel, either at K or L. As the ashes, clinker, or purified refuse is removed, a fresh portion follows down the inclined bars, the place of which is immediately taken up by another portion of raw material descending from the hopper, this process proceeding continuously, or at such rate as material is found to emerge at K or L in a sufficiently burned condition.

At B is a new arrangement of furnace bars in the form of a step-bar grate, set at an angle of about 45 deg., with large spaces for the admission of air to increase the draught, so that no blowers for a forced draught are used by the patentees.

The feeding in of the material is said to be almost as gradual as though rocking bars were employed. The action of the hanging bridge, writes Mr. Royle[129], is also to be noted, "any vapour evolved from the raw material is deflected partly over the surface of, and partly actually through, the already incandescent portion, where it also meets the red-hot gases arising from the combustion of the lower portion and becoming ignited, finally passes through the combustion chambers, heating these to such a high temperature that no combustible vapour can escape. As each spadeful is withdrawn it is followed through the whole system by an equal volume of the raw material, the volatile matter from which being thus slowly evolved, has ample time for complete combustion, which cannot be the case where large charges are thrown on at one time. Although designed as a destructor only, it is as capable as any other of being adapted to the generating of steam when the material to be burned contains enough heat-producing material; it equally permits the use of rocking bars, as also the use of a steam or other blower being applied. For the latter purpose it is only necessary to close the front, as is usually done, and fix the necessary blower or fan."

The inventors of the "Acme" destructor claim for it that:—

(1) It can be constructed at less first cost than any other.

(2) For efficiency, for ease of working—that is, the feeding with raw and the removal of burnt material—it offers every advantage.

(3) That, from its simplicity and freedom from working parts, it is less liable to get out of order than any other, therefore will neither require expensive skilled labour nor incur frequent stoppages with consequent decrease of working time. Any repairs needed can be done by any ordinary blacksmith or bricklayer.

(4) That it effects complete combustion of all carbonaceous or other organic matter in a systematic manner, all vapours having to pass through red-hot material and highly-heated combustion chambers, thus rendering the escape of noxious gases impossible.

In regard to the capabilities of the "Acme" as a steam producer, and as to the question of utilisation of heat generated by destructors generally, the inventors express the following opinions:—"It is impossible to forecast this amount until experiments have shown what amount is given by them when in actual work, the conditions being so various. To this end we recommend that a boiler should not be put down until this has been ascertained. The amount of combustible matter may be more or less in the refuse of one town or place than another, and therefore the heat generated be more or less; and as a boiler should be proportionable in dimensions to the amount of fuel used, until this is known it is impossible to give accurate dimensions. We are confident that our destructor will give out the full calorific value of the burnable matter in the refuse."

The "Acme" furnace is also claimed to be a "fume cremator" in itself, so that any additional provision in this direction would be superfluous. The furnaces are simple in construction, and have a grate area or fire-bar space of 36 square feet. The cost of erection is given at about £180 per cell, including roadway over the cells and royalty.

Some furnaces of this type, fitted with "Step-Bar Grates," are in use at Messrs. Tennant and

[128] Patent No. 8732 (1892).

[129] *Vide* paper on "The Acme Refuse Destructor," by H. Royle, A.M.I.C.E., read at the Liverpool Congress of the Sanitary Institute, 1894.

Company's Chemical Works, Mill-street, Clayton. At Messrs. Tennant's works a trial has recently been made in the burning of town refuse in two small grates, each 4ft. by 1ft. 6in., *i.e.*, 12 square feet area. In these six loads of refuse were burnt in 33·5 hours, being ·179, or about one-sixth of a load per hour. Unfortunately the loads were not weighed, but assuming the weight of each at 24 cwt., the consumption was at the rate of $\left(\frac{24}{6}\right)$ 4 cwt. per hour, *i.e.*, $\frac{4 \text{ cwt.}}{12 \text{ sq. ft. grate area}} = 33$ cwt. per foot grate area per hour. There was no forced draught the draught, on the contrary, was slight in comparison with that ordinarily obtainable in connection with a tall destructor chimney, and the smallness of the furnaces was unfavourable to the test.

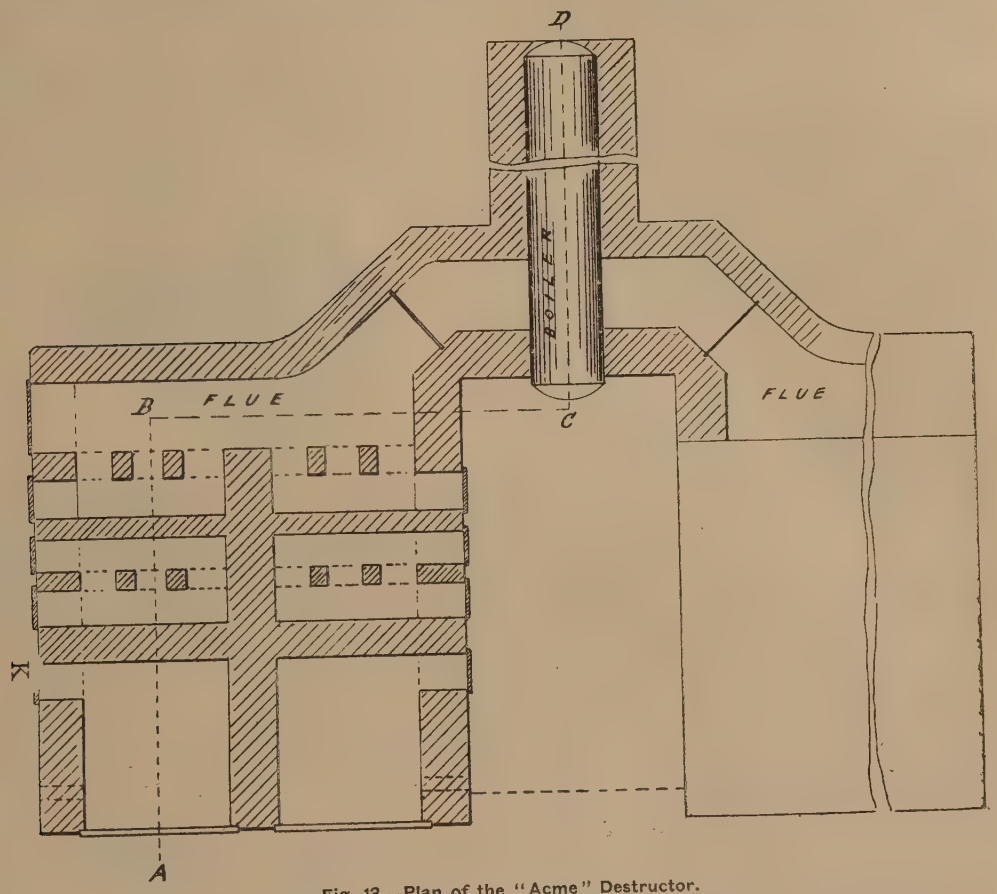


Fig. 13.—Plan of the "Acme" Destructor.

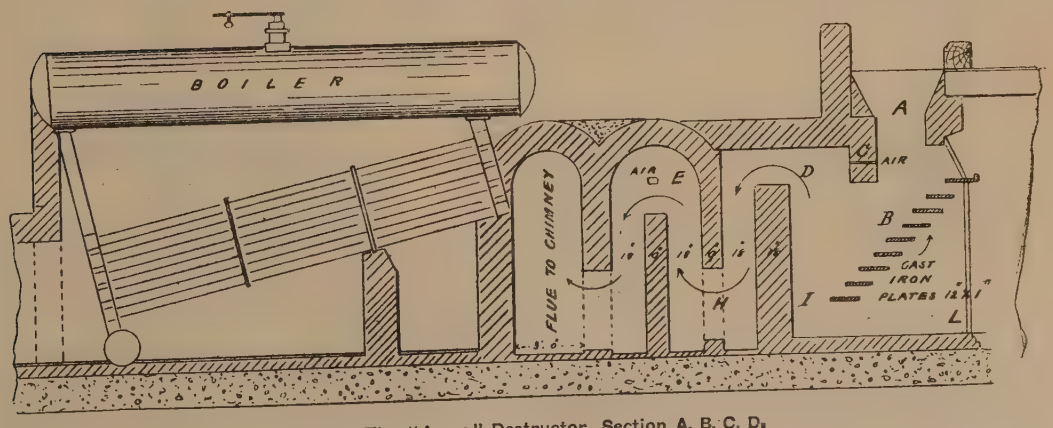


Fig. 14.—The "Acme" Destructor, Section A, B, C, D.

THE SANITATION OF DOMESTIC BUILDINGS.

By Frank Latham, C.E., M. San. Inst., &c., Assistant Surveyor, Borough of Margate.

CHAPTER IV.

Section 1.

TRAPS AND GULLIES.

Traps are arrangements in connection with drains which arrest the flow of air or gas into, out of, or along a pipe, and where the sewage or water automatically forms the seal.

Gullies are special forms of traps placed on drains or at the end of branches to give free inlet to waste waters and other matters, and at the same time prevent the escape of any air or gas from the drain, either when the gully is in action or not. There can be no doubt that the question of traps

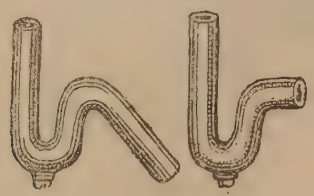


Fig. 27.

requires close attention, as these are the principal barriers relied upon to arrest the foul air present in drains and prevent its escaping into houses or other places where its effects might be injurious to health. Their internal surfaces should be as small as possible compatible with efficiency, and fitted with suitable arrangements for inspection and cleansing. Every sanitary arrangement in connection with the drains and inside of houses should be trapped, and the trap fixed as close to the apparatus as possible in order to leave no portion of the connecting pipe open to the internal air.

To effectually prevent the passage of drain air, every waste pipe from apparatus inside houses, with the exception of w.c.'s, urinals, and slop sinks; such as scullery sinks, lavatory basins,

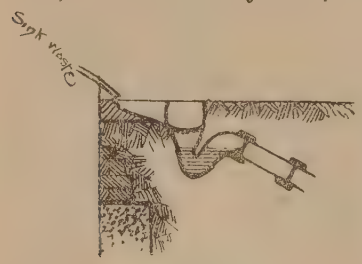


Fig. 28.

Fig. 29.

baths, &c., after being trapped by means of a syphon trap (Fig. 27), should be taken through an external wall and made to discharge in the open air, over a channel leading to a properly-trapped gully. (Fig. 28.) In the case of the waste pipe being on a higher floor than the gully, it should be connected with a special waste pipe carried up with an open end as a ventilator, and discharging in the open air at the foot. These wastes are, however, in some towns made to discharge by means of a "swan-neck" into an open cistern head (Fig. 29) leading to a gully trap, which is not to be recommended, owing to the cistern-head becoming very foul. The "Model Bye-laws" of the Local Government Board require wastes to discharge over a channel at least 18in. distant from the gully, and this condition successfully answers two purposes, viz., in the case of the escape of drain air through the gully, the waste pipe will be sufficiently far away as to be out of danger as an intake; and, again, in the case of sinks, the water and grease will have an opportunity of cooling before entering the drains by

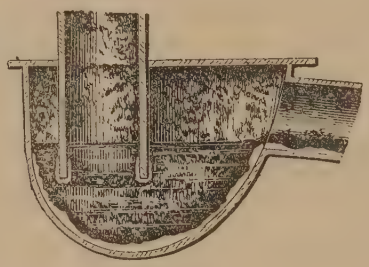


Fig. 30.

being exposed to the open air—another good feature in this arrangement. Overflow pipes from cisterns, and all descriptions of safes, should not in any case be made to discharge directly over a gully, but in some suitable, conspicuous position, where waste of water would be immediately detected, and the cause remedied.

All rain-water pipes for the conveyance of water off roofs should discharge at the foot in the open air over trapped gullies. By so doing, should the gully become stopped, it can easily be cleaned out, and in cases of drought where there is insufficient

Fig. 31.

rain to seal these traps, they can be regularly attended to and the water supply replenished, but if the pipes were connected up directly with the trap, upon the latter becoming stopped, there being no means of access for cleansing purposes, the water must rise and stagnate in the pipes or escape through the joints and cause damp walls, whilst in the time of drought the trap upon becoming unsealed would allow the drain air to ventilate up these down pipes and cause a nuisance. It is a mistake to make openings in drains to receive small and intermittent quantities of water, as there may not be sufficient usage of the gully to remain sealed, therefore in all cases of this description, where such connections are required a second waste pipe from a scullery sink or bath should

also be taken into it in order to keep the gully charged.

Gullies should never be placed inside houses; it is a dangerous practice so to do, as the most evil results must necessarily follow, either through the trap becoming dry or the drain air forcing itself through the water seal. All gullies should therefore be placed outside in the external air, and all waste pipes made to discharge with open ends also in the external air.

It is an important feature to have the waste

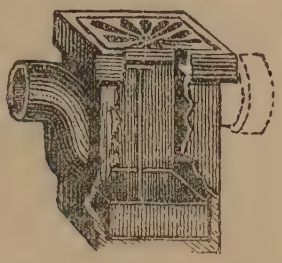


Fig. 32.

pipes of apparatus, such as scullery sinks, baths, and lavatory basins, trapped, although some may argue that owing to these being disconnected and made to discharge in the open air over gully traps there is no necessity for so doing, and, further, that traps are a disadvantage as the water is obstructed in its flow. But it is obvious that such traps, besides shutting out of the house any smells that may emanate from the filth in the gully trap and waste pipe, &c., prevent, in case the gully becomes unsealed through defect or otherwise, the escape of drain air, which, owing to the warmth of the inside of the house, as compared with that of the outside, may be drawn or blown through the sink

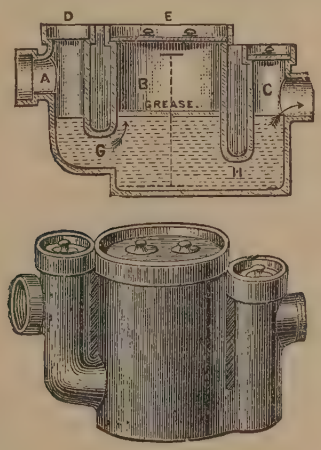


Fig. 33.

waste. It is a frequent occurrence that in removing the bucket of the sink gully for cleansing purposes the water-line is lowered, and sometimes the trap left unsealed until the sink is again used. This would certainly give a facility for the admission of drain air into the house should there be no proper trap to the sink waste. Again, if not for the trap, the waste pipe itself being corroded with decomposing matter, would be a vehicle for fouling and passing tainted air into the interior of the house. In the case of baths and lavatory basins, these arrangements are generally situate above the ground floor, and have, therefore, long lengths of waste pipe, and although there may be sufficient disconnections in their course the results will not be satisfactory unless the bath is trapped, as after a time the pipes become coated with grease and other filth, and throw off objectionable effluvia, which is liable to be drawn into the interior of the dwelling.

It takes a good deal of discretion in selecting the best trap for various purposes, there being such a variety to choose from. The form of trap suitable should therefore be considered in conjunction with the position and purpose for which it is required. Good traps should have a dip of not less than 2in., to prevent their becoming unsealed.

The two principal enemies which traps have to fight against are syphonage, and the excess of air pressure to which drains are occasionally subjected. Syphonage is caused by a vacuum set up in drains. This is occasioned chiefly by the ventilation being insufficient and being so a sudden flush immediately sucks the water out of the nearest trap to give ingress to the required amount of air displaced, and thus leaving the trap open for the escape of drain air into the house. The excess of air pressure in drains is again a matter of ventilation, which owing to the momentum and force of the water passing through the drain an amount of air is displaced in its course, this air forcing its way through the least resisting outlet, and should there be no ventilation pipe it will escape through the water seal of the nearest trap. It therefore shows that a good dip should always be insisted on, especially in the case of those traps which are subjected to sudden and rapid flushing, under which circumstances they are liable to run themselves unsealed. Too much care cannot be exercised in fixing traps, as often a good trap will be rendered useless by being badly fixed. For instance, traps should be kept perfectly upright, and not allowed to fall over towards the front, for if this be the case they will not form the trap required, and perhaps will not seal. They should also be made of the same materials as the drains, with which they connect, so that they can be satisfactorily jointed, as it would be almost as well to have no trap as bad joints.

Gullies when at the ends of branch drains should always be set up in connection with the drain on a good bed of cement concrete, and well surrounded with that material. By so doing the trap is not only materially strengthened, but at the same time, is afforded that additional support required for the ends of the branches, especially as the trap is of extra weight, and as a rule, furnished with very little bearing surface. The manner of jointing gullies with the ends of drains should be noted. As a rule, the outlet of gully with a strand or two of gasket fastened round it is placed into the socket of the drain pipe and the joint cemented up. This, although the general way, is not quite satisfactory, it being difficult to make a good and perfect joint without proper access to the interior of the pipes, which cannot be obtained through the trap. To gain this access the last length of pipes to which the gully is to be fixed should have an inspection eye or square junction at the top, which, upon the joint being finished, and any surplus material inside the pipe removed should be closed over with a proper stoneware

stopper and cemented down. It is a mistake to use gullies and traps larger than is necessary, but no gully should be less than 4in. inlet, at the same time, a 4in. gully with 6in. outlet is sufficient for a 6in. drain for most ordinary purposes. The traps known as the D and Bell traps should never be used in modern drainage; the D trap (Fig. 30) being anything but cleanly, and the Bell very unreliable. (Fig. 31.)

To prevent the drains becoming coated with grease, which frequently is the cause of much trouble and derangement, proper grease-traps should be fixed to receive the sink waste water in

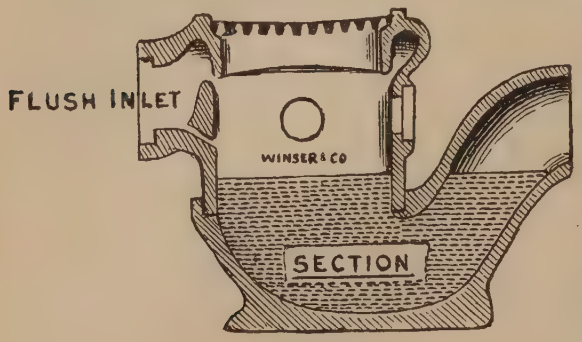


Fig. 34.

order that any fat that may exist may either be intercepted or cooled before entering the house drains.

Fig. 32 shows an ordinary small grease-trap with bucket. This trap is of little use unless the grease is regularly removed and trap cleansed.

Fig. 33 illustrates Buchan's patent grease-trap. This trap is manufactured by Messrs. Craig, and is one of the best of its kind. The sink waste water passes under G and H before entering the drain at C, giving the grease good opportunity of either collecting in the principal chamber B, and readily removed at E, or of becoming set, and thus not clogging the drain.

Fig. 34 is a grease-trap with flushing rim to enable the contents to be occasionally flushed out by means of an automatic syphon cistern.

THE MAIDSTONE INQUIRY.

The Maidstone inquiry having been brought to an end the Inspectors will, no doubt, report to the Local Government Board with as little delay as possible, though some time must elapse before their conclusions can be made known. Meanwhile, it is worth noting, remarks the *Standard*, that the experiment of holding a public investigation, which had been reluctantly agreed to as a departure from the normal procedure, has been justified by the result. It has occupied the time of three Government Inspectors for eight days, and has put some money into the lawyers' pockets, but it has at the same time ensured a much more minute examination of the facts than could have been obtained in any other way. The proceedings have been watched by a number of persons interested in different aspects of the main question, and have elicited a great many details which would otherwise have escaped attention. It is not too much to say that no epidemic has ever been so exhaustively examined; this fact alone would make the method of inquiry a matter of congratulation. There is only one thing to regret about it, and as the precedent may be followed on some future occasion, it should not be passed over. The decision of the Town Council neither to engage counsel nor to call expert evidence was a distinct blunder. Their motives, as explained by their own solicitor in open court, do them little credit. According to him, they originally asked for the inquiry because they thought it would assist them in recovering from the water company the expenses incurred in consequence of the epidemic; but when they discovered that they had no claim against the company, their interest in the affair greatly diminished. The Local Government Board, following its regular practice, declined to give preliminary sanction to the payment of fees for counsel and expert witnesses out of public money, whereupon the Town Council resolved to show their dissatisfaction by engaging neither. Mr. J. S. Davey, the presiding Inspector, stated in plain terms that the inquiry was not held to assist the Town Council in bringing an action against the Water Company, but, in the public interest, to ascertain the facts; and he intimated that the Local Government Board would doubtless sanction all legitimate expenses after the inquiry was over. The Authorities, however, remained unmoved, and eventually Mr. Davey had to make himself personally responsible for the expense of calling Dr. Washbourn, a most important witness. The conduct of the Town Council is, however, thrown into stronger relief by the action of the Water Company, which has behaved extremely well throughout, and promptly offered to share the expense, although Dr. Washbourn was a hostile witness. In the end he was called, and gave evidence, to the great advantage of the inquiry. But the Town Council remained unrepresented by counsel throughout, thereby exposing their own witnesses to the unfair ordeal of a forensic cross-examination without adequate protection, and encouraging a reckless disregard of legal procedure. In non-judicial inquiries of this kind the strict rules of a Court of Justice are not observed, nor is it desirable that they should be; but some order with regard to evidence ought to be insisted on, or the cross-examinations and re-examinations may go on for ever. The only way to keep a clever counsel in check is to have an equally able advocate opposed to him, and for want of one in this case much time was uselessly lost, and witnesses were needlessly worried.

With regard to the cause of the outbreak, the general upshot of the inquiry has been to confirm the opinion previously formed, and to fix the responsibility on the Farleigh water supply. Heroic efforts have been made to shift it on to the drains, with the admirable result of exposing the neglect of owners of house property and the supineness of the Sanitary Authority. That is one of the great advantages of a public investigation. It has laid bare a state of things which no one can attempt to defend, and in doing so it has ensured, as nothing else could, a speedy reform. Abuses which the Medical Officer has vainly denounced for years will now be swept away by the general demand of the community. It appears

that for a long time past, out of six thousand houses in the town, about four thousand, or two-thirds of the whole, have had no water laid into the closets which were hand-flushed. Four years ago the Sanitary Authority began to use the powers it possesses, but was so tender of putting pressure on the owners of all this insanitary property that reform only proceeded at the rate of about two hundred houses a year. At this pace it would have taken just twenty years to complete, and when the epidemic arose it found Maidstone still in the enjoyment of some three thousand unflushed house drains. Now, we are informed, the work is proceeding in a very different fashion, and as rapidly as an increased staff can get on with it. No doubt; but meantime those three thousand unflushed drains have put a weapon in the hands of the Water Company which their adroit advocate flourished in the face of the Town Council with great effect. It may have unsettled the minds of some of the inhabitants, as it was probably intended to do, but of course it will not in the least impose upon the Government Inspectors. Bad as the drains are, and very likely responsible in some measure for the continuance of the fever, the exposure of their defects does not weaken the case against the water as the primary origin. Absolute proof of the precise causation of an epidemic like this cannot be expected; it is never obtained, and probably never will be, on account of the complexity of the questions involved, and the length of time which must elapse before investigation can be made. But the chain of evidence in the Maidstone outbreak is only short of absolute demonstration. Its character was typical of water-borne disease; the incidence corresponded with the water supply, and with nothing else; the cutting off of the suspected source was followed by marked subsidence; a particular spring was found open to specific pollution, and proved on examination to be so polluted; lastly, the precise manner in which the pollution probably took place was explained by the extremely interesting and original observations of Dr. Adams on the rainfall and the subsoil water. It would be mere affectation to pretend to a scientific suspension of judgment in the face of these facts. If the cause of the epidemic has not been proved, as some hairsplitting gentlemen are pleased to maintain, then the cause of no epidemic on record can be said to have been proved, and sanitary science may as well begin all over again.

Whether the occurrence could have been foreseen or not is, perhaps, open to question; but it is quite certain that none of the parties concerned are in a position to throw stones at the others. If the Water Company gathered their water from a dangerous source, the Town Council never troubled their heads about it, and in a spirit of miserable parsimony deliberately abandoned monthly analysis, their only safeguard. It was little enough, but it might have sufficed, if not to prevent, at least to cut short the trouble at the outset. They preferred to save forty pounds a year and run the risk of losing fifty thousand pounds—a moderate estimate of what the epidemic has cost. The ratepayers, for their part, not only sanctioned that policy, but refused, so late as 1896, to take the supply into their own hands. If blame is to be distributed, there is enough to go all round. It is pleasanter to distribute the praise. The inquiry has brought out very plainly the admirable manner in which the emergency was met by everyone concerned. The organisation for the care and relief of the sick, and the protection of the healthy, was most complete. The Town Council spared neither money, nor time, nor trouble. The water company, and especially the manager, Mr. Ware, gave all the assistance in their power, and promptly complied with every sug gestion. Finally, the Medical Officer and his deputy, Mr. Percy Adams, to whom the main bulk of the work fell, distinguished themselves by equal zeal and capacity. These are matters of local interest, but there are others of much wider importance. There is the adequate protection of gathering grounds, the duty of regularly inspecting them, which involves legal right of access by the Sanitary Authority, and the necessity of making frequent analyses of water. Incidentally, also, the question of hop-pickers and other seasonal immigrants has been raised. It is a difficult thing to deal with, but some reform of the arrangements prevailing in the neighbourhood of Maidstone is imperatively needed. It will be the duty of the Kent County Council to see to it before next season.

FROM WHENCE CAME THE FEVER TO LYNN?

DR. ST. GEORGE MIVART INVESTIGATES AND REPORTS.

It is barely four months since the news was published that a serious outbreak of enteric fever had taken place at King's Lynn. The announcement created considerable consternation, for at that time the epidemic at Maidstone was raging with unabated force, and fears were entertained that the country at large was about to be visited with a plague of typhoid. Happily the fresh outbreak proved only local, and though violent for a time, its virulence was spent within a month or so. Still the fact of such a visitation being possible was sufficient to call for a stringent inquiry by the Local Government Board, and Dr. St. George Mivart was sent down to Lynn to ascertain the source from which the contagion arose.

His report has just been issued, and we cannot think it is pleasant reading for the Town Councillors and inhabitants of King's Lynn, for it is the old story of warnings neglected, and a refusal to learn by experience. Dr. Mivart prefaces his report with a reference to former epidemics, and briefly traces by means of tables the progress of the outbreak last October. Taking the six fortnights ending November 23rd, he found the following notifications were received :—

	Houses invaded.	Cases.
Ending Sept. 14th	4	4
,, 28th	4	4
Oct. 12th	5	9
,, 26th	183	214
Nov. 9th	139	172
,, 23rd	23	42

In the last week of November two houses were invaded, the persons attacked numbering eight. Commenting on the statistics, Dr. Mivart says that "In 1897 to the end of August, Lynn and its neighbourhood suffered no more than the customary

amount of enteric fever. Next, during successive fortnights of September, and in early October, this disease became twice to three times as prevalent as in any previous month of the year. Then occurred an extraordinary outbreak of enteric fever. In the fortnight ending October 26th fever in Lynn and Gaywood increased thirty to fortyfold, and maintained during the next succeeding fortnight a nearly equal degree of prevalence. Afterwards it quickly declined; so that by the beginning of December the epidemic as such was practically at an end. In all, there occurred in Lynn and its neighbourhood between September 1st and November 30th 453 cases and 44 deaths referred to enteric fever—an attack-rate by the disease of 23·45, and a death-rate of 2·28 per 1000 of the census population."

In an analysis of the age incidence it is shown that 42 cases were reported under 5 years of age, 79 between 5 and 10, 100 between 10 to 15, 118 from 15 to 25, 37 from 25 to 35, and 29 from 35 upwards.

The "Causation of the Epidemic" is next dealt with, and in seeking explanation, says the Inspector, "It has to be borne in mind that the outbreak occurred suddenly; that it appeared simultaneously in the town of Lynn and its suburb Gaywood; and that from first to last (especially in the fortnight of its chief incidence) the fever was distributed throughout the length and breadth of both places. Outbursts of enteric fever such as this—so sudden and so widespread throughout a large and populous area—have again and again been referred on incontestable evidence to specific pollution of public water supplies. In the particular instance, the past history of Lynn and Gaywood, along with the facts respecting their present fever and their circumstances at the date of my arrival in the place, afforded a strong presumption that the epidemic was due to the faulty character of the public water service. I did not, however, accept such presumption, preferring rather to examine, as matter of first instance, other accredited agents of enteric fever, some of which had been thought of locally as quite as likely as the water supply to be responsible for the fever which was occurring. In this way I came to be concerned with (1) sewerage and drainage; (2) general sanitary circumstances; and (3) milk supply, as possible causes of the outbreak."

The Medical Officer, Dr. Bruce Low, in his report on an outbreak of enteric fever, of a very similar though less extensive character at King's Lynn in 1892, thus describes the sewerage of Lynn:—"The public drainage consists, in the older parts of King's Lynn, of short sections of brick sewers constructed some years ago, and discharging by different outfalls directly into the Ouse or into one or other of the fleets. For the northern and eastern part of the town a long length of sewer was a few years ago laid down. This sewer, which receives the sewage of more than half of the houses in the town, has an outfall near the old dock and is generally known as the 'dock culvert.' For a considerable distance it is an egg-shaped brick sewer, and throughout it is ventilated at intervals by openings at the street level. Here and there shafts have been carried up above the level of the house roofs. There are several automatic flushing tanks at the ends of branch sewers. Few of the sewers appear to be self-cleansing. Deposit takes place in nearly all of them. The tide dams up the sewage in all for several hours daily. Private drainage is effected by ordinary pipe drains. Gullies in yards are mostly trapped. Rainfall pipes usually pass directly into the drains. In some cases sink pipes are not disconnected, but the majority of houses have no sinks indoors. Soil pipes in some cases are ventilated; much improvement in this respect has been effected of late." And as regards Gaywood he says:—"The sewers of King's Lynn extend into the village of Gaywood. There are roadway ventilators along the main sewer, and a flushing tank is situated at a point where the sewer from Gaywood joins the borough main sewer."

As regards sewerage, the above description may be taken as describing to a very large extent the present condition of Lynn. Certain lengths of brick culvert sewer, which were specially defective, have been replaced by pipe sewers, but the general arrangement remains the same, and the sewage is still tide-locked for several hours daily. When an exceptionally heavy rainfall occurs at the time the sewers are thus closed by the tide, more or less extensive flooding is caused of streets, yards, and even of houses.

Two exceptionally heavy rainfalls occurred in August and September. The town was flooded, in some parts the water coming from the drains and sewers being almost black, and when it subsided a foul-smelling deposit remained behind. An investigation was made as to prevalence of fever in houses situated in the parts where the flood was most severe, but it was found that there was nothing exceptional followed; and after carefully considering all the circumstances Dr. Mivart concludes that "faulty sewerage and drainage are not responsible for the sudden outburst of enteric fever."

With regard to the general sanitary circumstances, reports by Mr. W. Whitaker, F.R.S., and Dr. Bruce Low are quoted to show the condition of Lynn at the time of the former outbreak in 1892. Dr. Mivart says:—"There is crowding of houses upon area at certain points, but I met with no instances of overcrowding of persons. There is no doubt that the Sanitary Committee have effected improvements since the last epidemic of enteric fever in 1892. In many of the closest and most crowded courts and alleys I found that water-closets, fitted with flushing cisterns, had been provided, though, it must be added, not a few were out of order and in a foul condition. It is also still the fact that, as stated by Dr. Low in his report, in some courts the closet accommodation is inadequate, and the privies are too close to the dwellings. Notable instances of this were seen in the vicinity of Windsor-road. Leading out of this thoroughfare are certain streets of cottage residences, many of which had cesspit privies in a foul condition. Moreover, the backs and sides of the brickwork are not rendered in cement, and in some cases I detected cracks which must allow free soakage from the privy into the adjoining premises. The arrangements for the emptying of privy pits are very defective. Upon the application of the householder the contents of cesspits are removed in iron tank carts belonging to the Corporation. As Dr. Low observes: 'In the process of emptying some privy pits the contents have to be carried through the houses.'

"Nevertheless, I did not find that the incidence of the fever had been heavier upon the inhabitants of the worst class of dwellings, or that the epidemic outburst in October had specially affected the least wholesome quarters of the town. Up to the date of my last visit I found that not a few of the closest courts and alleys had either altogether escaped the visitation, or that at most single cases, often of a mild type, had occurred in them. On the other hand, on certain residences which could not be classed among those styled poor, the incidence of fever had been very severe. In particular, I visited two dwellings, of the superior type of small house, in each of which five cases and one death had occurred. In neither of these houses were conspicuous sanitary defects to be found. The water-closets were outside the houses, and the only defect worthy of note was that in one case the scullery waste pipe (which was not trapped) delivered outside the house, too close to the gully hole, the exit of the waste pipe being actually below the 'grid' covering of the gully. But as this was open to the air, it could not be contended that there was direct communication with the sewer. As I have said, upon the whole there was absence of any evidence that general sanitary circumstances had been responsible for the simultaneous appearance of cases of enteric fever throughout the district."

A very brief inquiry into the milk supply was sufficient to set aside the suggestion that milk had been the means of conveying the disease. Next week we shall refer to that portion of the report dealing with the water supply.

THE INCORPORATED SOCIETY OF MEDICAL OFFICERS OF HEALTH.

DR. SERGEANT ON "INSPECTION OF COWSHEDS."

A MEETING of the members of the Incorporated Society of Medical Officers of Health was held on Friday evening, 11th February, 1898, at the offices of the St. Giles's District Board of Works, 197, High Holborn, W.C. Dr. E. Seaton, Medical Officer of Health to the Surrey County Council, the President of the Society, occupied the chair, and there was a good attendance, including Drs. Armstrong, Cameron, Bond, Willoughby, Groves, and Allen.

Dr. E. SERGEANT read a paper on "Inspection of Cowsheds," taking as the basis of his remarks a resolution passed by the North-Western branch of the Association: "That in order to secure greater efficiency and uniformity in carrying out the regulation under the Local Government Board Orders relating to dairies, cowsheds, and milkshops, it is desirable that the responsibility of inspection should be entrusted to the County Councils concurrently with the existing Urban and Rural Authorities." The necessity, he said, of obtaining the greatest purity in our milk supplies was evident when it was remembered how extensively cows' milk is used by all classes, and not unfrequently forms the sole sustenance of human life. Quoting figures of the late Mr. Ernest Hart, he showed how many deaths were due to epidemics occurring through the agency of milk, and it was suggested from long experience that these figures, striking as they were, only touched the fringe of the subject. Such outbreaks of disease might be entirely prevented, yet it must be admitted that the experience gained during the last twenty years had not borne the fruit which it should have done and did no credit to the boasted advancement of civilisation. There was an imperative need for the rigid enforcement of regulations for the inspection and periodical examination by competent Inspectors of all cowsheds, dairies, and milkshops. When the prevalence of tuberculosis among animals was remembered the danger to consumers could be properly appreciated. Experience showed in no uncertain manner that the supervision existing by Sanitary Authorities outside London is, with comparatively few exceptions, a delusion and a snare; as a whole their inspection is in no way calculated to protect the public from contaminated milk. Rural Authorities had adopted the mistaken policy of non-interference, and cowkeepers were indifferent to the dangers incurred by a distant milk-consuming public. To save the expense of a few pounds, filth, overcrowding, and badly ventilated sheds were allowed to remain. Many Authorities discouraged the action of their officials and suspicion naturally attached to milk produced by dairymen who could give no guarantee that their milk is provided under sanitary conditions. Such indifference to the needs of the case was greatly to the discredit of Local Authorites, and called for prompt action. In the majority of regulations now adopted no standard for cubic space is allowed at all, and consequently the Sanitary Inspector was in a difficulty in securing the necessary improvements. He thought that the minimum cubic air space should be 800ft. for each animal, and many difficulties would be avoided if Sanitary Authorities throughout the country had the same standard to guide them. There was no good reason why cowsheds should not be subjected to one standard rule laid down by the Local Government Board. In a considerable number of districts no cowsheds or dairies were registered at all, so that very little sanitary control could be exercised over the milk trade, and mostly the whole matter had to be left to the discretion of the Sanitary Inspector as to whether to go and what to insist upon. There were no regulations as to drainage, water supply, flooring, or cleanliness, so that Inspectors were often in the dilemma of knowing that the insanitary conditions prevailed, yet could not enforce improvements because of the absence of standards or regulations and bye-laws. Dr. Sergeant laid it down that (*a*) the supervision of cowsheds generally is far from satisfactory; (*b*) that regulations are only partially adopted, and not always with the intention of being put into force; (*c*) that the action taken in districts is wanting in uniformity and efficiency owing to different methods of inspection carried out by the various Authorities; (*d*) that milk is frequently distributed to distant communities possessing no power of control over its production, and without a sufficient check against the introduction of disease and contamination. As a remedy he suggested (1) the carrying out of the Dairies, Cowsheds, and Milkshops Order be made compulsory throughout the country in accordance with regulations from time to time issued by the Local Government Board; (2) regulations for the ventilation, drainage, water supply, and cleansing of cowsheds. (3) the periodical inspection of cattle; and (4)

precautions for ensuring cleanliness by dairy farmers and milk sellers, so that the milk should not become contaminated during transit. He believed if these or similar regulations were enforced, the public health would no longer be in danger, and the outbreaks of milk-borne disease, which played such havoc would entirely disappear.

An interesting discussion, in which the Chairman, Dr. Armstrong, Dr. Groves, and others took part, ensued, with the result that it was unanimously resolved, on the motion of Dr. SERGEANT, seconded by Dr. ARMSTRONG, "That in order to secure greater efficiency and uniformity in carrying out the regulations under the Local Government Board's Orders relating to dairies, cowsheds, and milkshops, it is desirable that the responsibility of inspection should be entrusted to County Councils, concurrently with the existing Urban and Rural Authorities." It was further resolved, "That model bye-laws should be framed by the Local Government Board for the regulation of dairies and cowsheds throughout the country, so as to ensure uniformity and efficiency" These regulations were referred to the Council for the purpose of submission to the proper quarters.

A hearty vote of thanks to the Chairman closed the interesting proceedings.

THE SANITARY INSTITUTE.

PURIFICATION OF WATER FOR BARRACKS, PRISONS, AND OTHER INSTITUTIONS.

A SESSIONAL meeting of the members of the Sanitary Institute was held on Wednesday, February 9th, at the Parkes Museum, Margaret-street, when Dr. C. Louis Parkes, M.D., D.P.H. (London University), presided over a good attendance.

Professor J. LANE NOTTER, M.A., M.D. (Dub.), delivered a lecture on the "Purification of Water for Barracks, Prisons, and other Institutions." He said that when large institutions are being dealt with in regard to their water supply something more is required than ordinary domestic filtration for the purification of the water. But at the outset it was absolutely necessary that the source of the supply should be above suspicion. No system of purification would render a water supply under any conditions perfectly safe. Now the system of purification of any suspected water had generally been by filtration, either on the non-pressure system or with pressure, and filters could be divided into those with pressure and those without. Of the non-pressure filters in use mostly up to the present time perhaps animal charcoal was the most common. But animal charcoal contained phosphates and nitrogen, and from experiments he had no hesitation in affirming that it forms an admirable breeding ground for micro-organisms; therefore it was considered an unsafe medium for water filtration. It also had the objection of allowing organic matter to pass through unchanged. Perhaps the

SUBSTANCE MOST IN USE

next was spongy iron, which acted as a filter owing to its fine state of division. The chief objection to spongy iron was that it did not sterilise water, removing only from 40 to 50 per cent. of the micro-organisms, increases the free ammonia, and had a tendency to coke, while it also added iron to the water. With the exception of sand filters, he knew of no filter for domestic purposes which would sterilise water. The second class of filters—the pressure filters—were those of the Pasteur-Chamberland type, made of China clay, the pores being extremely fine. In every experiment he had made the Pasteur filter had sterilised water, but the difficulty in connection with it was that of the joints, and where it was used for military purposes this formed one of the chief objections. The liability to fracture and the difficulty of plugging up the holes afterwards limited its use for military purposes, except for barracks and similar institutions, where proper supervision could be carried out and where much movement was not required. Where plenty of time could be allowed for the filtration, so far as he knew this was one of the best classes of filtration that they had at the present day. But he thought that the thickness of the material was not enough, and that there ought to be more rapid filtration. Having referred to other classes of filters, the lecturer said that the great difficulty was the

QUESTION OF CLEANSING

them and keeping them in order. How could they keep them in order so that they might always be relied upon to act? In active military life it was extremely difficult to get the soldier to do this, for the soldier generally had a disregard as to whether water was filtered or not. Besides, except where there was a public water supply these filters could not be used because pressure is required, and that pressure must not be too extreme, or the micro-organisms would be driven through. These filters had no chemical action on water, they simply sterilised it; they did their work well, and, if proper attention was paid to them, seemed to afford every security. But if they were dealing with water very different to that which is obtained at home, water containing growths of desmidiæ and diatomacæ, rapidly flourishing under a high temperature, he had known these filters to get so coated as to almost prevent the water passing through within a comparatively short time. This could of course be remedied by constant cleaning.

FOR SMALL DISTRICTS,

schools, barracks, and prisons, a sand filter often proved invaluable. He knew of one not far from London, put up by Mr. Rogers Field, which had worked perfectly. One point he desired to emphasise, and that was that there should not be a duplicate water supply in any place, because where two systems existed there was always a danger. People would not take the trouble to distinguish between one tap and another. Also the placing of a large number of small filters in one institution was a thing they all decried. The water supply of large institutions in which a number of people were congregated ought to be supplied filtered and fit for drinking on a large scale, and the best method for this was a sand filter. He had seen in many places a sand filter, properly constructed, properly laid, and of sufficient depth, with the rate of flow guarded against being too excessive, yield as a rule pure water, unless originally it was in a bad condition. It certainly would render ordinary water purified in the majority of cases. But there

were perhaps certain conditions under which of all others they could not depend upon filtration at all, but such conditions were seldom to be found in civilised life. These were the conditions of water met with in

ACTIVE MILITARY OPERATIONS,

and the question then arose, "Is it possible to add anything to water that will render it absolutely sterile?" "Is it possible with our present knowledge of infectious disease to so render water sterile without submitting it in any way to filtering action?" He had lately been making some experiments with regard to this, and so far he had been eminently successful. During those experiments he had found certain things occur which increased our knowledge of the whole subject. In Germany a few months ago it was suggested to add to suspected water a certain solution of bromine, and afterwards to decolorise it by using a solution of hydro-sulphate of sodium. He had made a number of experiments to test this, as it would be invaluable in many cases in which filters failed, or in circumstances in which filtration was not possible. They were done under conditions which he thought admitted of no fallacies. Giving the details of these experiments, the lecturer showed that he had been able to sterilise water infected with the typhoid bacillus by adding a certain quantity of bromine. The colour was removed by a certain proportion of sodium hydro-sulphate and sodium carbonate. The water had a pleasant sharp taste, and no odour of bromine could be detected. They often heard of the antagonism which exists between chemical and bacteriological examination, but here he thought one helped the other. In these experiments, forty in number, he could not help noticing how the presence of organic matter in the water influenced more or less the growth of pathogenic forms in the water. In perfectly

PURE DISTILLED WATER

they appeared to have no effect whatever, but directly a water was made impure they appeared not only to remain in the water, but to amplify largely; at any rate, they appeared to increase in number. It was often said that chemical analysis gave no indication, but he thought that, on the contrary, it gave a very excellent indication; it tells of a condition of water which, if a specific organism is introduced, is likely to spread, to multiply and propagate itself. In distilled water these organisms did not appear to increase; whether they died or or not he was not at present quite certain. This showed that they must, to a large extent, rely on chemical analysis to show the condition of water, and on the bacteriological examination to define what the organic matter really is, whether it is due, as it might be, to animal pollution, or simply to vegetable organisms. This principle which he had mentioned had been exercising their thoughts a great deal lately on account of the excess of enteric fever in the far northern country of India, where it is impossible to resort to a system of filtration and those means of purifying water which are found in England to-day. If they could, by adding to water some solution such as he had indicated to render water sterile, he thought they might to a certain extent reduce the mortality from that disease in tropical countries where it proved so fatal.

ANOTHER METHOD

had been introduced, he was not sure by whom, as coming from Vienna last year, but he did not think it gave such good results as those he had mentioned. He alluded to calcium hypochlorite, and the only difficulty he found with it was that of dissolving the salt. These experiments, however, were all very recent, and he should be sorry to accept them yet, but gave them for what they were worth. Turning to the oldest method of sterilising water, that of submitting it to the action of heat, he thought that looking to his own experiments, water had been sterilised without boiling it. Prof. Wright and himself had found that organisms could be destroyed at a temperature of from between 60 to 70 deg. Cent. With this heat he was satisfied that organisms were destroyed and water was rendered sterile. The plan in use for military purposes generally, and in many civilsed districts—and at Maidstone—had been simply to boil water; and, perhaps, after all, there was no surer, simpler, or better method, if people would only do it, than to simply boil water to sterilise it. But boiling takes time, and people did not always wait for it to boil. Soldiers were specially liable to do this, and drink the water long before it was rendered safe. The lecturer then referred to various systems of the application of heat to water, and said he had no doubt if the practice complied with the theory perfectly, water would thus be rendered

COMPARATIVELY STERILE

and free from danger, but he could not speak with more certainty than this, because, so far as he was concerned, the matter was still *sub judice*. But it appeared as if a want was being met which they had all experienced up to the present time. Of all the questions brought before him for years past, that which had bothered him most had been the purification of suspected water supplies and the difficulty of dealing with them wherever young men, soldiers, troops, &c., are centred throughout the kingdom and scattered abroad, where they would depend upon supplies which were anything but advisable. This question stood almost in the forefront of sanitary knowledge: day by day they noticed the large number of cases of enteric fever, and in London, according to Dr. Shirley Murphy, there was a close relationship between the increase of enteric fever—or its prevalence—and the conditions of the water supply. He hoped that someone who had had practical experience on this very interesting subject would enable them to come to some broad conclusions with regard to it and diffuse useful information.

Discussion ensued, the Rev. F. LAWRENCE, Mr. WOLFF DEFRIES, Dr. RIDEAL, Dr. CHILDS, and the CHAIRMAN taking part.

Professor NOTTER having replied to some of the points raised, a hearty vote of thanks to the lecturer and chairman concluded the proceedings.

At an examination for Inspectors of Nuisances, held at Glasgow on February 4th and 5th, 1898, twelve candidates presented themselves. The following seven candidates were certified, as regards their sanitary knowledge, competent to discharge the duties of Inspectors of Nuisances:—R. P. Fleming, J. Gilfeather, J. Irving, A. Macqueen, J. McClement, A. Smith, Miss A. N. White.

PLUMBERS' WORK AND PUBLIC HEALTH.

THE annual meeting of the Leeds District Council was held at the Mechanics' Institute on Wednesday, 9th February, at which a large number of plumbers, architects, sanitarians, and others, were present.

Dr. CHURTON, who was cordially received, moved: "That this meeting urgently recommends the movement for the National Registration of Plumbers to the notice of all Sanitary Authorities, and of all interested in sanitation, as being calculated to bring about further improvement in the conditions of life amongst our populations; and this meeting further urges the desirability of legislation as needful in order to gain those compulsory powers without which the benefits to be derived from the proper education or examination of plumbers can only be partially realised." He enlarged on the need that existed for educating in the matter of sanitation, not only the plumber, but the people who suffered from sanitary defects, and also the people whose inadvertence or neglect permitted insanitary conditions to exist. It was necessary to compel the attention of these people. As illustrating the need for the diffusion of knowledge for which he pleaded, Dr. Churton cited instances of the effects of sanitary defects that had come within his own knowledge. One was the case of a skilled artisan, who ought, he said, to be a strong, healthy man to-day, but who was a physical wreck because he had lived for fifteen years in an unhealthy house, although he knew when he first became its tenant that the sanitation was defective. Another instance was that of an insanitary house which came under his notice six years ago, and which had been deliberately left in that condition because the agent feared that the landlord would object to the expense of remedying the defect. A third case was that of an office, which the doctor said he had had frequent occasion to visit. Girls were employed as clerks, and though at the outset they had every appearance of enjoying good health, he observed that they were becoming more and more pallid. This circumstance impressed him so strongly that he called the attention of the Sanitary Authorities to the place, with the result that it was discovered that these girls had been working in an atmosphere impregnated with sewer gas. He strongly urged that people who lived in such an atmosphere practically ceased in time to be reasoning beings. The mechanical portion of their intellect alone was left, and it was hopeless to expect them to take the initiative in remedying the evil. There were those who thought that if in this matter they made people too touchy and accustomed them to such fine conditions of living, they would unfit them, say, as soldiers for the rigours of a campaign on the Indian frontier. He was of opinion, he admitted, that we were perhaps overdoing the refinements of life for those who were going to be soldiers, but it was absurd to suppose that by giving them one sort of bad condition we could prepare them for another which was totally unlike it. In conclusion, Dr. Churton referred to the Bill under consideration, and reminded his audience that the privileges which it was proposed to confer upon plumbers would be accompanied by responsibilities. If registered plumbers, as such, were to be granted a virtual monopoly, then a heavy responsibility would attach to those who did work, as he had seen it, so badly that it amounted almost to manslaughter.

Sanitary Inspectors' Associations.

THE NORTH-WESTERN AND MIDLAND.

THE twelfth meeting for the present session of the above Association was held at the Liverpool Royal Institution, Colquitt-street, on Saturday last, the 12th inst.

There was a large number of members present, the President (Dr. Francis Vacher) occupying the chair. Messrs. E. Oakes, Sanitary Inspector, Bolton; W. H. Roby, Chief Sanitary Inspector, Pemberton; and J. Crosby, District Sanitary Inspector, Liverpool, were unanimously elected as members; additional nominations being also received. The transaction of the formal business having been completed, the Chairman called upon Dr. George Reid, County Medical Officer, Stafford, to read his paper on "Sanitary Inspectors and Sewage Disposal."

Dr. REID, who was warmly received, said that it might have been possible to have fixed upon a subject bearing more immediately upon the daily duties of Sanitary Inspectors, but he doubted whether any branch of public health work afforded greater interest in a scientific sense than the problems associated with the efficient disposal of the sewage of towns and villages. Sanitary Inspectors might, moreover, be called upon, and in the future would, no doubt, become more frequently called upon, to act in a detective capacity, in order to keep their respective Authorities informed as to any irregularities taking place in the working of sewage disposal plant, and especially would this be the case in small urban and rural districts. Sewage was a highly putrefactive material containing impurities both in a solid and liquid form. If the solid impurity were removed by any mechanical process, say, by filtration through ordinary filter paper, it was obvious that no actual change was effected beyond the removal of the solid matter, although the result to the eye appeared highly satisfactory.

If the filtrate were kept for a short time, however, the clear fluid became nearly as turbid and offensive looking as the original sample. It was not sufficient, then, to remove from the sewage the solid organic and mineral matter it contained; unless the soluble organic and therefore putrescent material were rendered non-putrefactive, it would in time develope a solid organic *débris* or sludge, which would be deposited in the beds of streams, various putrefactive gases being given off whilst this process was taking place.

It was an undoubted fallacy to suppose that by any chemical process hitherto devised, sewage could be purified to an extent which would meet legal requirements. Chemistry afforded a very valuable and, until recently, possibly, almost an essential step in the process of purification, but no more than a step. The addition of certain chemicals to sewage assisted very materially in the removal of the solid matter, but no chemical hitherto used could effect

the removal, to any material extent, of the organic matter in solution.

The removal of the suspended solids by some process or another was now looked upon as an essential preliminary to further treatment. Crude sewage could not be applied to ordinary artificial filters without at once clogging their pores, and for the same reason application to land was forbidden, unless the available area was very much larger than usually could be acquired.

The conditions essential to successful precipitation by chemical methods having been described, the lecturer passed on to a consideration of the second stage of purification. It was, he pointed out, only within quite recent times that they had any definite knowledge of the process by which dead organic matter was disintegrated. It was supposed that the whole process was a chemical one brought about chiefly by oxidation with the assistance of vegetation. It was known that certain soils had a very powerful purifying effect, provided the sewage was not applied in excess, and so long as short intervals were allowed for aëration. It was believed, however, that after a time the land became "sewage sick," and required a long-continued rest in order to recover itself. Now they knew that this was not the case ; that there was no limit to the length of time land might be continuously in use, provided the quantity of sewage applied to it was not excessive, and that regular and frequent intervals of rest, for aëration only, were allowed. In fact, up to a point the more constant the application of the sewage, the more active the purifying power of the land.

They were indebted to the Massachusetts State Board of Health in the first instance for opening their eyes to the essential principles upou which the artificial filtration of sewage depended. By the elaborate and extensive experiments conducted by that Board, three important facts were established ; first, that the size of the particles composing the filters was all-important ; secondly, that failure would result if a certain comparatively small volume of sewage per yard of filter in a given time were exceeded; and, thirdly, which was the key to the whole question, that the active agent in the process of purification was bacterial life.

It was further known that there were two distinct classes of bacteria engaged in bringing about the disintegration of all dead organic matter—the aërobic and the anaërobic. If sewage were dealt with so that the anaërobic organisms had free scope in attacking it, the change was effected by an unwholesome putrefactive process which polluted the air with foul gases, and the full result could not be attained without the assistance of the aërobic organisms. On the other hand, if the latter organisms were enabled to attack the sewage before the putrefactive organisms had time to proceed very far in their operations, the whole process could be efficiently conducted in a wholesome manner. It mattered not whether the method of disposal was by land or by artificial filtration, success could not be obtained under conditions which were inimical to the life and welfare of aërobic organisms. Suffocate these organisms by depriving them of air, and neither land nor artificial filters would have the slighest effect beyond that of mechanical straining. Other things equal, it followed that the smaller the particles comprising the filter the more perfect the filtration. The subdivision must not, however, be carried too far, for a point would be ultimately reached when the percolation downwards of the sewage took place that water-logging resulted. The material, too, of which the filter was to be composed, was of far greater importance than might be supposed, and although it was not his intention to enter upon a discussion of the comparative merits of different filtering media, they might be interested in hearing a short account of some experimental filters which he had had under observation for more than twelve months. One of these filters was composed of sand and gravel, specially constructed on Lowcock's principle, by which air was continually pumped into the interstices ; another was constructed of coke breeze ; and the third was Garfield's coal filter. These three filters were worked under similar conditions with the same tank effluent—200 gallons per superficial yard being passed through them in twelve hours, and a rest of twelve hours was allowed for aëration.

Dr. Reid exhibited a diagram showing the comparative results attained in the reduction of albuminoid ammonia in the effluent compared with the sewage, the reduction in the amount of oxidisable organic matter, and the amount of nitrification which had been effected, the best results having been obtained by the coal filter, the gravel filter on Lowcock's principle, however, nearly approaching coal in respect to efficiency.

It was difficult to understand at first why coal gave results so greatly superior to coke breeze, and this the more as it had always been supposed that the more porous the material the better its filtering powers. Dr. Barwise, the Medical Officer of Health of Derbyshire, had suggested that the pores of the individual particles of coke retained considerable portions of sewage in a non-aërated state, by virtue of the force of capillary attraction, thus causing putrefactive changes to occur. That this theory contained a great deal of truth there was little doubt, but it not wholly explains the excellence of the coal filter results, for they were not equalled by other non-porous filtering media.

Dr. Reid concluded his address by referring to the two most recent methods which had been suggested as substitutes for chemical precipitation. First, there was the septic tank method, introduced by Mr. Cameron, in which strained sewage was confined in a tank from which the air was excluded. The result was that putrefactive changes took place, which were, of course, brought about by non-aërobic organisms, and the sludge thus disintegrated, leaving a comparatively clear liquid, which, so far as freedom from suspended solids was concerned, might be applied to a fine aërobic filter.

From the first he had looked upon this method with disapproval, notwithstanding the unanimity with which engineers and others hastened to embrace it, because it appeared to him to violate the great principle which had hitherto guided them of keeping the sewage as free as possible from putrefactive changes, previous to its application to land or artificial filters. Up to the present time he had not seen any analytical results from this method of treatment which had caused him to modify his opinion.

The second process consisted in applying crude sewage directly to a large particled filter, and in this case the whole operation was conducted by

aërobic organisms. With intervals for free aëration, the nitrifying organisms which formed in such a filter appeared to have the power of disintegrating even the solid organic matters, as in the case of the finer filters, for dealing with clarified sewage, the process seemed to go on indefinitely, if mineral matter, such as road detritus, were kept back. Of course the effluent from such a filter had to undergo further treatment either by land or finer artificial filtration; but notwithstanding this, the preliminary gain was enormous from an economical point of view.

The discussion was opened by the PRESIDENT, who was followed by Mr. WM. URQUHART (Chairman of Council), Mr. W. BLAND, Dr. MEREDITH YOUNG, and Mr. R. JOHN HUGHES, a hearty vote of thanks being passed to the lecturer at the close.

Dr. REID acknowledged the vote of thanks, and commented in strong terms on the obstructive tactics adopted by the Local Government Board in the past, when dealing with sewage disposal.

THE CLOSING OF ELEMENTARY SCHOOLS IN TIMES OF EPIDEMIC.

MUCH surprise was expressed by many when it was rumoured that the elementary schools of Maidstone were in danger of losing the Government grant through closing their doors during the recent epidemic in obedience to the orders of the Authorities.

We do not think for a moment the Education Department will take such an extreme action. If it does, it will certainly make it very difficult for public officers to take this necessary step of ordering a temporary cessation of school work when zymotic diseases are unusually prevalent in their districts. Naturally members of Councils are inquring what powers they really possess, and for the benefit of all who may not have seen it, we publish below the salient points of a "Memorandum" prepared in the Medical Department of the Local Government Board last summer. It is signed by Dr. Thorne Thorne, who describes it as an attempt to bring together the information in the possession of the Department, as derived from its own Medical Inspectors and Medical Officers of Health respecting school closure and exclusion from school as precautions against infection, with a view to indicate the best means of preventing the spread of disease by school children among their fellows, while avoiding any unnecessary interruption of the work of education.

In the Code of Regulations approved by the Lords of the Committee of Council on Education, the following Article (Art. 88) prescribes, as one of the general conditions required to be fulfilled by a Public Elementary School in order to obtain an annual parliamentary grant, that:—"The managers must at once comply with any notice of the Sanitary Authority of the district in which the school is situated, or any two members thereof, acting on the advice of the Medical Officer of Health, requiring them for a specified time, with a view to preventing the spread of disease, or any danger to health likely to arise from the condition of the school, either to close the school or to exclude any scholars from attendance, but after complying they may appeal to the Department if they consider the notice to be unreasonable."

Article 83 (*a*) prescribes that "if a school has been closed during the year under medical authority, or for any unavoidable cause, a corresponding reduction is made from the number of meetings" (400 a year) required. Article 101 provides that where the Education Department "are satisfied that by reason of a notice of the Sanitary Authority under Article 88, or any provision of an Act of Parliament, requiring the exclusion of certain children, or by reason of the exclusion under medical advice of children from infected houses, the average attendance has been seriously diminished, and that consequently a loss of annual grant would, but for this Article, be incurred, the Department have power to make a special grant not exceeding the amount of such loss in addition to the ordinary grant." Here it will be observed such cases as Maidstone are specially provided for.

The diseases for the prevention of which school closure, or the exclusion of particular children, will be required are principally those which spread by infection directly from person to person, such as diphtheria, scarlet fever, measles, whooping-cough, epidemic influenza, small-pox, and rötheln. More rarely, the same questions arise in connection with enteric fever and diarrhœal diseases, which spread not so much by direct infection from person to person as indirectly through the agency of local conditions, such as infected school privies.

It will be seen that Article 88, quoted above, confers upon Sanitary Authorities an alternative power with respect to public elementary schools. (A) To cause particular scholars to be for a specified time excluded from attendance; or (B) to require the school to be closed for a specified time.

(A) First, as to exclusion from school of particular scholars. Here it will be convenient to consider the circumstances under which the requirements of the public health will be satisfied by the less severe measure of the exclusion from school of particular children. (*a*) It may be laid down as a universal principle that all children suffering from any dangerous infectious disorder (*i.e.*, of a nature dangerous to some of the persons attacked by it, however mild in other cases) should be excluded from school until there is reason to believe that they have ceased to be in an infectious condition (*see* Section 126 of the Public Health Act, 1875).

(*b*) Furthermore, as it is rarely possible to provide effectual separation of the sick from the healthy within the homes of children of the class attending public elementary schools, it must commonly be necessary that all children of an infected household should be excluded from school; first, because otherwise such children might attend school while suffering from the disease in a latent form, or at an unrecognised stage; and, secondly, because it is known that infection may attach itself to, and be conveyed by, the clothes of a person living in an infected atmosphere, even though the person himself remain unaffected. The same considerations will sometimes make it desirable to prohibit the attendance at school of all children from a particular street or hamlet. In the case of infectious diseases involving little or no danger to life, such as mumps or skin diseases, school interests may be more particularly considered. In such case, however, it will usually be well for the Medical Officer of Health to advise the mana-

gers to prohibit the attendace of every child while in an infectious state.

(B) Secondly, as to the closing of schools. This, by more seriously interfering with the educational work of a district, is a much more grave step for a Sanitary Authority to take than to direct the exclusion of particular scholars. It is a measure that seldom ought to be enforced, except under circumstances involving imminent risk of an epidemic, nor even then as a matter of routine nor unless there be a clear prospect of preventing the propagation of disease, such as could not be looked for from less comprehensive action. The mere fact that in an epidemic many of the sufferers are school children does not necessarily show that the disease was caught at school; but the school may with probability be regarded as spreading infection if in a large majority of households attacked the first case be a child attending school; and with still greater probability if a number of children living at a distance from one another, and with no circumstances in common, except that they attend the same school should be simultaneously attacked, and if it can be ascertained that a child or teacher in an infectious state has actually been attending the school.

By Article 18 (6) of the Board's order of 23rd March, 1891, the Medical Officer of Health on the occasion of an outbreak of dangerous infectious disease is to advise the persons competent to act as to the measures to be taken to prevent the extension of the disease. If, therefore, he finds that the children of infected households are attending school he should send notice of the fact to the schoolmaster, and give such advice as appears to him to be necessary with regard to the exclusion of the children from school, and as to the time for which such exclusion should continue. Where the number of children to be excluded is small, and the schoolmaster acts on the advice of the Medical Officer of Health, it may not be necessary to take formal action under Article 88 of the Code; but where the number of children whom it is desirable to exclude from school is such as is likely seriously to diminish the average attendance, or where the advice of the Medical Officer of Health is not followed, and there is danger of the disease spreading by means of the school, notice for the exclusion of the children in question should be made in accordance with the requirements of Article 88.

Several "considerations" are set forth for the benefit of schoolmasters, showing how certain actions of and symptoms in the scholars may indicate the presence of disease among them. In such cases they are urged to at once communicate with the Medical Officer of Health. The length of time that exclusion of individual scholars should be enforced is also dealt with by Dr. Thorn. This should not be decided by any hard-and-fast rule, but the Health Officer should take into full consideration all the surroundings of the case. In some instances it may not be necessary to entirely stop the school work, and the following plan is suggested for deciding the best course to be adopted :—

In deciding whether an outbreak of infectious disease among children of school age may be best combated by closing the school, or whether it will suffice to exclude the children of infected households, the two most important points to be considered are :—(*a*) The completeness and promptness of the information received by the officers of the Sanitary Authority respecting the occurrence of infectious cases. (*b*) The opportunities which exist for intercourse between the children of different households elsewhere than at school.

(*a*) The more prompt and full the knowledge of cases of infectious disease that the Sanitary Authority are able to obtain, the better will be the prospect of checking such disease by keeping away from school the children of infected households, and the less will be the necessity for closing schools. Information obtainable under the Infectious Diseases (Notification) Act, 1889, is especially useful in this direction. If the cases be few in number, and their origin known, the exclusion from school of the children of infected households will probably suffice, but this measure will fail where there are many undiscovered or unrecognised cases, or where the known centres of infection are very numerous. Commonly, the failure of carefully considered measures of exclusion to stay the spread of an epidemic which shows a special incidence upon school children, may be regarded as pointing to the continued attendance at school of children with the prevalent disease in a mild or unrecognised form, and a strong case will appear for the closing of schools. If by reason of the absence or exclusion of a large number of children, the attendance at a school be greatly reduced, it may be found better to close it altogether. This is especially apt to occur in the case of epidemics of measles, a disease which is very infectious in the early stages, before the characteristic rash has appeared, and while the symptoms resemble those of a common cold.

(*b*) The second material consideration, in deciding as to the desirability of closing schools during the prevalence of infectious disease, is the amount of opportunity for intercommunication between the members of different households elsewhere than at school. In sparsely-populated rural districts, where the children of different households, or of separate hamlets, rarely meet except at, or on their way to, the village school, the closing of the school is likely to be effectual in checking the spread of disease. It is less likely to be useful in a town or compact village (particularly where houses are sub-let and yards are in common), where the children of different households when not at school spend their time in playing together, and often run in and out of each other's houses. But it must be remembered that children when at play out of doors are brought into much less close association with each other than when in school. In rural districts, where epidemic diseases are less frequently prevalent, school closing may be required as an exceptional measure to meet an exceptional state of things. As regards more populous places, it must not be forgotten that if schools were to be closed whenever an infectious disease was prevalent, there are many places where schools would hardly ever be open. It will sometimes be necessary to close a school for a day or two to allow of the rectification of sanitary defects of a nature to extend disease, or in order that the school may be disinfected or purified. It has happened that infectious sickness in the master's family has forbidden the attendance of scholars. These more temporary and occasional closures of schools are contemplated in the Education Code, and are to be regarded as having a real importance of their own.

In places where there are several public elementary schools, if an outbreak of infectious disease be confined to the scholars of one particular school, it may be sufficient to close that school only. But where different schools have all appeared to aid in the spread of disease (though perhaps to an unequal extent) the Sanitary Authority may consider it advisable that all should be closed lest children in an infectious state who previously attended the schools that are closed, should be sent to others that might remain open. It must be remembered that Sanitary Authorities have no power in respect of Sunday-schools, or other private schools; except in so far as these may contravene Sec. 91 (5), Sec. 126, or other provision of the Public Health Act, 1875; but it will often be expedient to invite the co-operation of managers of such schools in efforts for securing the public health. Experience shows that they are usually ready to defer to the representations of the Authority responsible for the public health of the district.

The latter part of the last paragraph is important. Granted that as a rule the Committees of Sunday-schools gladly fall in with the request of the Medical Officer, occasionally some may decline to act upon his advice. Therefore to make the step effective, when it is necessary to close the elementary day-schools, the Sunday-schools should also be compulsorily closed, for the self-same children attend in each case.

Institute of Sanitary Engineers

THE CHEMICAL EXAMINATION OF WATER.

By RICHARD HORTON.

(*Continued from page* 150.)

THE process for determining the amounts of free and albuminoid ammonia is not quite so simple as that for chlorine, but, as said before, it presents few difficulties even to those new to chemical experiments. The apparatus required is simple and inexpensive, and is as follows:—A glass retort capable of holding rather more than a litre; it must have a stoppered tubulure. A 24in. condenser, the glass tube being about 34in. by 1in., and a metal body 24in. by 3in. The body must have metal nozzles at either end for cold water supply, and for carrying off the heated water. Six special glass cylinders, with containing marks at 50 cubic centimetres. A half-litre flask. A 25 cubic centimetre burette graduated in tenths of a centimetre. A 2 cubic centimetre pipette. Stands for supporting the retort and condenser. A good Bunsen burner. Half litre of Nessler reagent. A dilute standard solution of ammonium chloride, strength equal to one hundredth of a milligramme of ammonia to each cubic centimetre. An alkaline solution of permanganate of potash. Carbonate of soda. Distilled water, free from ammonia.

All the above can be purchased, excepting the distilled water, which cannot be bought pure enough for the purpose, so the first thing to be done will be to prepare it as follows:—

First clean out the retort with a little strong sulphuric acid, and well rinse with plenty of ordinary tap water; then mount the retort on its stand, and fit the beak of same into the condenser, also mounted on its stand. About three-parts fill the retort with tap water, and arrange with india-rubber tubing for the circulation of a small stream of water inside the outer jacket of condenser; adjust the Bunsen burner so that the retort is well in the flame, taking care that the naked flame is not above the water line in the retort. Upon boiling the water will distil over, carrying with it any ammonia that may be present. Reject the first 250 cubic centimetres of distillate, and then collect about half a litre, the process then being stopped, as it is not advisable to collect more, in case the distillate may again contain ammonia, from destruction of organic matter.

The distillate must be received into a perfectly clean bottle, and the analysis may be commenced by thoroughly cleaning and rinsing the retort as before. The half-litre flask is then filled exactly up to the mark with the sample of water, a small fragment of soda carbonate being added, and carefully poured into the retort, which has been mounted on its stand, and connected with the condenser as before, the apparatus being raised sufficiently to allow the cylinders to receive the distillate.

It is imperative that the distillation should be rapid, and to effect this the retort must be well in the Bunsen flame. There need be no fear of breakage if a good retort be obtained (I get mine from Townson and Mercer), and care taken that the naked flame does not extend above the water line. There must be no support, such as a retort ring, to the bottom of retort.

When the first cylinder is filled exactly up to the 50 cubic centimetres mark it is put carefully on one side for further treatment, and the distillation continued until 150 cubic centimetres more are collected, which may be thrown away, and the process stopped for a time. If the water has been rapidly boiled the whole of the free ammonia will have come over in the 200 cubic centimetres of distillate, but as it has been found that three-fourths of the ammonia invariably come over in the first 50 cubic centimetres collected, the ammonia in that is ascertained, and the total amount calculated from it.

Nessler's reagent has the property of detecting very minute traces of ammonia, and the success of the process depends upon this. If 2 cubic centimetres of Nessler's test are added, by means of the pipette, to the distilled water in the cylinder which was put on one side, and well stirred with a clean glass rod, a yellow to a rich brown coloration will be formed, the depth of tint depending upon the amount of ammonia present. The tint formed in the sample has now to be matched by making up solutions of known strengths of ammonia with the specially distilled water, and adding 2 cubic centimetres of Nessler's test until the desired match is obtained, the tint being judged by placing the cylinders upon a white glazed tile in front of a window, and look down the tubes. In illustration, the following is taken from my note-book:—

Chelsea water, May 29th, 1896.

Free ammonia.—To first 50 cubic centimetres distilled add 2 cubic centimetre Nessler, faint coloration; made up solution with ·5 cubic centimetre standard in ammonia free water, too much; with ·2 cubic centimetre standard, too little; made-up

solution with ·3 cubic centimetre of standard, colour matched; ·3 cubic centimetre of standard equals ·003 milligrammes of ammonia. Therefore the 50 cubic centimetres Nesslerised contained ·003 milligrammes of ammonia, but as this represents three-fourths of the total amount of free ammonia in the sample,

·001 milligrammes must be added

·004 milligrammes in 500 cubic centimetres
2

·008 milligrammes in 1000 cubic centimetres.

The free ammonia is therefore ·008 parts per million.

It is advisable to wait for two or three minutes before making a final observation, as the full tint may not present itself immediately. The ammonia yielded by the destruction of organic matter has now to be considered, and this is effected by adding 50 cubic centimetres of the alkaline solution of permanganate of potash to the remainder of water in the retort, and continuing the distillation until three cylinders have been filled up to their 50 cubic centimetre marks, all of which must be saved for Nesslerising.

Sometimes "bumping" of the contents of the retort may alarm the operator; this may be prevented by gently shaking the retort, or, as I find, by waving the gas flame from side to side. The distillation in this part of the process is slower than that for free ammonia, and needs careful watching throughout. The contents of the cylinders may now be Nesslerised, and the ammonia in each determined in exactly the same manner as for free ammonia.

The following are my notes in the examination for albuminoid ammonia in the same sample of Chelsea water as before:—

Albuminoid ammonia.—To first distillate added 2 cubic centimetres Nessler, strong coloration; made up test solution containing 4 cubic centimetres standard, Nesslerised, not enough; made up test solution containing 4·5 cubic centimetres, colour matched.

To second distillate added 2 cubic centimetres Nessler, made up test solution containing 1·2 cubic centimetres standard, Nesslerised, too much; made up test solution containing 0·9 cubic centimetre standard, not enough; made up solution containing 1·0 cubic centimetre standard, colour matched.

To third distillate added 2 cubic centimetres Nessler, faint coloration; made up test solution containing ·3 cubic centimetres, standard, Nesslerised, not enough; made up solution containing ·5 cubic centimetres standard, not enough; made up solution containing ·6 cubic centimetres standard, colour matched.

	mgs.	
First distillate equalled 4·5 c.c. standard, or	·045	ammonia.
Second distillate equalled 1·0 c.c. standard, or	·010	„
Third distillate equalled ·6 c.c. standard, or	·006	„
	·061 in 500 c.cs.	
	2	
	·122 in 1000 c.cs.	

Albuminoid ammonia in the sample ·122 parts per million.

As the albuminoid ammonia does not come over with the same regularity as the free ammonia, it is necessary to Nesslerise each cylinder, and also occasionally to collect a fourth, if the coloration is more than faint, in the third cylinder.

We have now to consider the interpretation to be put upon the results obtained from the examinations for chlorides, free and albuminoid ammonia, and I do not think a better judgment can be consulted than Professor Wanklyn's. He says in his "Water Analysis," "Deep spring water is often so pure as not to yield 0·01 parts of albuminoid ammonia per million; and unless mixed with surface water, does not yield so much as 0·05 parts of albuminoid ammonia per million." "The filtered water supplied by water companies, no matter whether derived from a lake, from clean mountain streams, or from defiled rivers, yields from 0·05 to 0·10 parts of albuminoid ammonia per million; and, indeed, if the filtration be efficient, approximates to 0·05." "Our general conclusion is that, when the number rises to 0·10, there is defective filtration." And he further states that when the albuminoid ammonia is from 0·10 to 0·20 parts per million, "it is a matter of observation that diarrhœa is frequently prevalent in communities which drink such water." If a water contains no albuminoid ammonia it may be considered as organically pure, although there may be free ammonia and chlorides present, and when the albuminoid ammonia amounts to less than 0·05 it belongs to a good class of water; but, says Professor Wanklyn, "When the albuminoid ammonia amounts to 0·05, then the proportion of free ammonia becomes an element in the calculation; and I should be inclined to regard with some suspicion a water yielding a considerable quantity of free ammonia along with more than ·05 parts of albuminoid ammonia per million." "Free ammonia, however, being absent, or very small, a water should not be condemned unless the albuminoid ammonia reaches something like 0·10 per million." "Albuminoid ammonia above 0·10 per million begins to be a suspicious sign, and over 0·15 it ought to condemn a water absolutely." "Five or ten grains of chlorine per gallon are not a bar to the use of a water, but only a reason for suspicion under certain circumstances." If the amount of chlorine is small, the organic impurity is probably of vegetable origin, and if the amounts of chlorine and free ammonia are large, the presence of decomposing urine seems to be indicated.

(*To be continued.*)

TO OUR READERS.

The Editor solicits the co-operation of readers in making THE SANITARY RECORD *more attractive by means of pen-and-ink sketches, photographs, and diagrams. There are many phases of sanitary work which lend themselves admirably to illustration. By this means not only individual articles, but the journal as a whole will be brightened.*

General News.

HOME.

NOTICE.—On and after 31st March next the Annual Subscription to this Journal will be raised to 12s. 6d. to all NEW Subscribers. NO ADVANCE will be made to our friends whose names are entered on our Subcription list prior to that date, so long as they continue to Subscribe.

HEYWOOD.—The Town Council has decided to appoint a Borough Analyst.

CORNWALL.—An isolation hospital is to be provided, at an estimated total cost of £3600.

SKIPTON.—The Council has under discussion the question of erecting public slaughter-houses.

ASHTON.—The Guardians have agreed to advertise for an architect to prepare the plans for the new hospital.

NORTHFLEET.—A Committee has been appointed to take into consideration the propriety of erecting a public mortuary.

EASTBOURNE.—The Town Council has decided to purchase the Montpellier Baths at £2500, in order to convert them into public baths.

LEIGH-ON-SEA.—The new waterworks of the Urban District Council were opened on Wednesday the 9th inst. The works have cost nearly £14,000.

BIRKENHEAD.—The Town Council has passed a resolution in favour of erecting salt-water baths at the north end of the town, at an estimated cost of £13,000.

ABERDEEN.—It is believed that the slaughter-houses on the Central Park site, which is the one to be recommended to the Council at its next meeting, will cost not less than £30,000.

WESTBURY.—The Local Government Board has sanctioned the application of the Rural District Council to borrow £8000 for works of water supply for the parishes of Westbury and Tilton Marsh.

HEXHAM.—The Urban District Council has decided to purchase from Dr. J. A Jackson, three-fourths of an acre of land situate in Haugh-lane, at the price of £300 for the erection of slaughter-houses.

BATTERSEA.—The Vestry has resolved to apply to the Local Government Board for sanction to the borrowing of the sum of £25,000 for the erection of the new public baths and wash-houses in Battersea Park-road.

STOURBRIDGE.—A Local Government Board inquiry has been held relative to the application of the Urban Council for compulsory powers for the purchase of a site for a refuse destructor near to the sewage pumping station.

RUSKINGTON.—The Local Government Board has found, as the result of an inquiry held in November on the petition of the Earl of Winchilsea, Captain Cragg, and others, that the Ruskington Urban District Council is in default with regard to providing a proper water supply, and that such a supply can be obtained. The Council is directed to procure such a supply within three months, and is ordered to pay the costs. The petitioners have thus fully proved their case.

HASTINGS.—A Local Government Board inquiry has been held into the application of the Corporation for sanction to borrow £139,000 for a new water scheme to be carried out in the Brede Valley.

UPHOLLAND. — A Local Government Board inquiry was held recently as to an application of the District Council for powers to borrow a further sum of £4000 for extension of the waterworks, purchase of land, and other expenses for waterworks purposes.

LEEDS.—The epidemic of scarlet fever shows little, if any, signs of abatement. There is no apparent diminution in the number of cases reported from day to day, 50 new patients having been conveyed to the fever hospital last week, as against 47 in the previous week.

MIDDLESBROUGH. — Small-pox continues to spread despite the energy which has been displayed by the Authorities in their efforts to stamp it out. So serious and alarming has the outbreak become, that bills have been freely distributed about the town advising people to be at once re-vaccinated.

GOOLE. — The Local Government Board has approved of the plans for the proposed new lavatories at the infirmary and extensive alterations to the laundry and wash-house at the Goole Union workhouse. The plans and specifications have been prepared by Mr. E. C. Buchanan Tudor, C.E., the Board's architect and surveyor.

COVENTRY.—At the last meeting of the City Council the Medical Officer of Health (Dr. E. Hugh Snell) reported that the principal figures relating to the vital statistics of the city for 1897 were as follows: Estimated population, 61,234; recorded death-rate, 16·8; average death-rate for previous ten years, 17·5; zymotic death-rate, 1·8; average ditto for previous ten years, 1·6.

MIDDLESBROUGH.—Owing to the epidemic of small-pox it has been decided to close the Lending Department of the Free Libraries and the Lending Library of the Literary and Philosophical Society. The Public Vaccinator has been ordered to make a house-to-house visitation to vaccinate the inhabitants free of charge, for which purpose the services of three doctors have been retained.

HOPE.—The directors of the Castleton Water Company have expressed their willingness to supply the village of Hope from their reservoirs on Losehill on terms to be agreed upon, and the District Council has approved of the arrangement. The engineers, Messrs. Sterling and Swann, of Chapel-en-le-Frith, consider the scheme is quite practicable, and it is probable negotiations will be entered into instead of an expensive scheme being carried out at Hope.

MORPETH.—At a recent meeting of the County Council of Northumberland the report of the Committee of Visitors regarding the proposed water supply to the County Asylum at Morpeth was unanimously adopted. The scheme provides for the conveying of water in a 6in. main from a spring at Doe Hill in the Witton Shields district to the Asylum, a distance of over seven miles. The water has been examined bacteriologically and chemically, and found to be of excellent quality. The scheme has been designed by Messrs. D. Balfour and Son, civil engineers, Newcastle, who will shortly advertise for tenders for the work.

GREAT HUCKLOW.—The Local Government Board has deferred its decision with reference to the application of the District Council for sanction to borrow £400 for works of water supply for Great Hucklow, as it would be desirable to include Great Hucklow in one of the groups to be supplied from the Camp Hill spring.

ABROAD.

NAIHATI.—The Naihati Municipality has under consideration the necessity of opening waterworks before long.

DINDIGUL.—The Dindigul Municipality has applied for a loan for the extension of the water-supply works.

HOWRAH.—The Bengal Government has sanctioned a loan of 40,000 rupees to the Howrah Municipality for extending their waterworks.

WINNEPEG.—Black diphtheria has broken out among the workmen on the Crow's Nest Railway. Several deaths and a number of new cases are reported. Owing to the mountainous nature of the region it is difficult to make proper provision for treating the disease.

Personal.

DR. SLADE KING has been reappointed Medical Officer for the Dulverton rural district.

MR. S. P. FRYER has been appointed Inspector of Nuisances for the rural district of Hastings.

MR. J. B. O. RICHARDS has been appointed Medical Officer for the Swinhope district of Caiston union.

MR. F. J. FROST has been appointed Medical Officer for the Llanhilleth district of Pontypool union.

MR. C. N. THOMAS has been appointed Medical Officer of the Sydney district of Chepstow union.

MR. E. J. WILSON has been appointed Inspector of Nuisances for the rural district of North Witchford.

DR. WALKER has resigned the position of Medical Officer to the Beverley union on account of continued ill-health.

THE Local Government Board has sanctioned the appointment of Dr. M. Gepp as Medical Officer of Health for Dawley.

DR. J. J. CLARKE has been appointed Medical Officer of Health for Walthamstow in room of Dr. St. Clair Shadwell, resigned.

MR. JOHN ALEXANDER BRODIE, a member of the firm of Wood and Brodie, engineers, has been appointed City Engineer for Liverpool, at a salary of £1000 per annum.

MR. CHAS. MASON, A.M.I.C.E., has resigned his Surveyorship to the Vestry of St. Martin-in-the-Fields, having accepted a partnership in the old-established business of Messrs. Foster and Pearson, heating engineers, &c., of Beeston. His resignation has been accepted with much regret, he having held the appointment for the past eight years.

Sewerage Schemes.

[To MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

A SPECIAL Committee has been appointed to deal with the West Hartlepool sewerage scheme.

THE Stowmarket Urban District Council has approved of the plans and estimates of the sewerage scheme, and will apply to the Local Government Board for a further loan of £5000.

THE Local Government Board have recommended the Public Works Loan Commissioners to lend £6088 to the Wombwell Council for the Wombwell and Hemingfield sewerage.

THE Local Government Board has sanctioned the Bucknall sewerage scheme of the Stoke Rural District Council, and the contractors will be ready to commence the work by the end of the month.

A LOCAL Government Board inquiry has been held relative to an application by the Rural District Council of Yeovil for sanction to borrow £1600 for purposes of sewerage and sewage disposal for the parish of Montacute.

THE Rural District Council of Uxbridge has consented to the expenditure and borrowing of the sum of £13,000 for the purpose of carrying out schemes of sewerage and sewage disposal for Eastcote and Northwood, in the parish or contributory place of Ruislip.

THE Hexham Urban District Council has decided to purchase from Mr. Wm. Ridley, the piece of land next his manure works, at 3s. 6d. per square yard, the estimated area required being 1500 square yards. This land is required for the septic tank system of sewage disposal.

AT the last monthly meeting of the Bolsover Urban District Council, the Engineer, Mr. Wagstaff, who was engaged to prepare a scheme showing the best method for sewage disposal at Bolsover, gave a descriptive report. He estimated the scheme would cost £2000, exclusive of the cost of land, &c. The report was deferred for further consideration.

A LOCAL Government Board inquiry has been held at Armagh into the applications of the Commissioners to be empowered to put into force the provisions of the Land Clauses Act for the purpose of enabling them to acquire, otherwise than by agreement, the lands in the townland of Drumcarn and Corporation, upon which it has been decided to construct the new disposal works, and to obtain the sanction of the Local Government Board to their borrowing a sum of £12,000 to enable them to provide the new scheme.

THE Local Government Board has given its sanction to the Honley Council borrowing £6028 for the purposes of the drainage of the district and part of the sum required for the outfall sewer and sewage disposal, which, however, does not include the drainage of Deanhouse and Oldfield, nor certain street improvements, for which further application will have to be made.

ON Tuesday afternoon, the 8th inst., the sewage works, which had been in course of construction by the Midsomer Norton Urban District Council at Welton, for treatment ot sewage for Midsomer Norton before flowing into the river Somer, were officially opened. The cost of the works has been about £2100. At the conclusion of the tour of inspection the chairman of the Urban District Council (Mr. G. Carter) expressed satisfaction at what he had seen, and said their engineer was to be congratulated on the way in which he had carried out the work.

AT a special meeting of the Newmarket Urban District Council held recently, Mr. Frederick Beesley, Engineer of the new main drainage scheme, read his estimate of the cost of the work, which was as follows: — The whole of the sewers, £24,203 14s. 3d.; manholes, £2220; deep manholes, £315; gullies, £100; ventilating columns, £250; bacteria tank system, £2836; automatic flushing tanks (six), £300; laying out and draining seventeen acres of land, £1500; railway crossing, £750 5s. 9d.; connecting house drainage, £2000; total £34,475. This was £6000 more than the original estimate; but the cost of material had risen from 5 to 10 per cent., the drain was to be laid deeper on Exning-road, and that, with the additional surface drains, &c., would account for over £5000 more. The other expenses he estimated as follows:—Land, £2000; Engineer's charges (5 per cent. on cost of work), £1750; Clerk of Works, £250; easements, £783; legal expenses and sundries, £767; total, £5500. It was resolved that powers to borrow £45,000 be immediately sought.

A SPECIAL meeting was held at Underwood recently for the purpose of laying before the ratepayers the proposed sewerage scheme. Mr. E. Briggs referred to the steps taken in the matter, and remarked that they had a loan standing against them of about £15,000 for the water scheme, and he thought if the proposed sewerage scheme was carried out it would mean another £15,000, which he considered would be more than they could undertake with a rateable value of only £20,000. The District Council had had plans got out, the carrying out of which it was estimated would cost something like £7000. As the result of negotiations with the Local Government Board it had now been ascertained that they could borrow money for such parts as required doing first, leaving the other sections to be subsequently completed. Finally, a resolution was adopted to the effect that the District Council use its best endeavours with the Local Government Board to have such portion of the sewerage works carried out as require doing first, and that the whole scheme be spread over as long a period as possible, the money to be borrowed from time to time as required.

THE Coventry City Council has adopted the report of the General Works Committee recommending the acceptance of H. Weldon's (Birmingham) tender of £39,734 14s. 7d. for the execution of the first portion of the works necessary for carrying out the Lodge Farm sewerage scheme, plans and specifications for which have been prepared by Mr. Mansergh. The tender is within Mr. Mansergh's estimate, and includes sewers, rising mains, tanks, and work on farm.

Lighting.

THE Skipton Council has under discussion the proposals for purchasing the plant of the Skipton Gas Company.

THE Derby Town Council have resolved to expend £126 for converting gas lamps and fittings into incandescent electric light lamps, and £346 for wiring.

THE Birmingham Gas Committee's report recommending the extension of the gasworks, at an estimated cost of £366,000, has been approved by the City Council.

A LOCAL Government Board inquiry has been held into the application of the Bramall Parish Council to borrow £500 for the purpose of lighting the North and South Wards of the parish.

THE Taunton Town Council has decided that application be made to the Local Government Board for sanction to the borrowing of £10,000 for purposes of electric lighting in the borough.

THE Urban District Council of Kettering has decided to defer the further consideration of the electric lighting of the town for a period of three months, when the new Council will be in office.

IT has been decided to adopt the electric light in St. Mary Church. The cost of the installation is estimated at £300, towards which donations to the amount of £100 have already been promised.

A MEETING of the Troon Commissioners was held recently for executing the Burghs Gas Supply Act. It was agreed that notice be given to the Troon Gas Light Company that the Commissioners are willing to buy or to treat for the purchase of the undertaking of the company, and that the Gas Company give notice before two months.

A STEADY organised agitation is being carried on in Barking against the electric light scheme. A committee has been formed advocating the adoption of a particular form of incandescent gas lighting, and literature on the subject is being freely distributed. Ratepayers are being invited to sign a petition against the electric light proposals.

Correspondence.

We do not in any way hold ourselves responsible for opinions expressed by our correspondents.

RELATIVE COST OF WORKS OF SEWAGE DISPOSAL.

(*To the Editor of* THE SANITARY RECORD.)

SIR,—In the second "Note" in your issue of the 4th inst. (page 105), it is stated that this question has not received the attention which it deserves; and we are invited to furnish figures which will enable Local Authorities to form an opinion on the subject. We need hardly point out that it is impossible to lay down any scale of cost which will be generally applicable, under the widely different circumstances which are met with in different places. Inasmuch, however, as your note is calculated to give the impression that our process is more expensive than that in use at Sutton, which impression is altogether incorrect, it may be well to quote a specific case in which very careful estimates have been prepared.

The works at Exeter have been designed to deal with the sewage of 47,000 people, the maximum flow provided for being 2,500,000 gallons per day. They are estimated to cost £13,940, including grit chambers, conduits to tanks and from tanks to filters, penstocks, &c., but exclusive of engineering charges. The cost is, of course, greater than for a place of the same size sewered on the separate system, in which not only would the size of the works be smaller, but no provision for removing road grit would be necessary.

It is assumed in your note that "under the Exeter system the cost of construction of tanks must be somewhat heavy, and being a patented process, royalties will be payable to the patentees." In this installation, however, not only is the cost of the tanks not heavy as compared with that of the filters, but it is actually only one-half of the latter amount. In the Sutton process two sets of filters are used, while in ours one set is replaced by the tanks, thus saving one-half the cost of one set of filters, to say nothing of the saving in cost of land. No royalty is included in the sum quoted above; but we may state that the royalty that we should charge in such a case would not bring the cost of our works up to that of works on the Sutton system.

In the Exeter works artificial walls are provided between the filters; but in any case where the site admits of these being dispensed with under the Sutton system they could equally well be done without under ours. Although the walls and floors do not represent by any means the heaviest part of the cost of filters, their omission would reduce to some extent the excess of this item over the cost of the tanks. Against this must be set the possibility of reducing the cost of the tanks under other circumstances; for instance, these now under consideration are larger than they would be in some cases for the same population. The fall required is often an important factor in the cost of works. The Exeter system requires only one-half the fall necessary for the Sutton system.

Hitherto we have dealt only with the question of first cost, which, as Sanitary Authorities have found by painful experience, is often the least formidable part of the burden entailed by sewage works. When we come to the cost of working, the advantage of the Exeter is still more marked. In the first place, the tanks deal with the sewage without preliminary screening, thus saving the cost of clearing the screens and disposing of the intercepted matters; secondly, they do not require the periodical trenching which is necessary for the coarse bacteria bed; thirdly, the automatic alternating gear saves the labour which would otherwise be required to work the filters, and, what is of greater importance, prevents the temporary losses of their purifying power which negligence on the part of the attendants is liable to bring about. If the annual saving which our system effects, even as compared with that of Sutton, is capitalised, we venture to think it will dispel any doubt which might otherwise exist as to the relative cost of the two systems.—Yours faithfully,

CAMERON, COMMIN, AND MARTIN.

7 and 8, Bedford-circus, Exeter,
8th February, 1898.

Law Cases.

INCANDESCENT INFRINGEMENT.

LAST week in the High Court, before Justice GORELL BARNES, sitting as an additional judge in the Chancery Division, Mr. A. J. WALTER moved, in the matter of the Incandescent Gas Light Company, Limited, *v.* Seligman, for judgment in default of defence, the action being one for infringement of letters patent held by the plaintiff company. Plaintiffs claimed the usual relief, an injunction to restrain, and also damages and costs. The particular act of infringement charged was a sale at 17, Union Passage, Birmingham, of mantles constructed in infringement of plaintiffs' patent. The defence, it was stated, had been struck out.

His LORDSHIP granted the order applied for.

IMPROPER FLUSHING APPARATUS.

EDWIN SHARLAND, Ambro House, Cheltenham, was charged, under the Public Health Act, with neglecting to comply with a requirement of the Sanitary Authority, to provide proper flushing apparatus in his premises.

The Town Clerk (Mr. E. T. Brydges) prosecuted.

Albert Edward Hudson, Sanitary Inspector, deposed that the defendant had not put up the flushing apparatus since the case was last before the magistrates.

Mr. Brydges said defendant could well afford to do the necessary work. The maximum fine under the Act was £5, with a daily penalty not exceeding £2 until the work was carried out.

A fine of £1 was imposed, with a daily penalty of 2s. 6d. to commence fourteen days from that day, until the work should be completed to the satisfaction of the Medical Officer. Costs, 10s., went with the sentence.

Notes and Queries.

[Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C.]

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

964.—DIPLOMA FOR SANITARY SCIENCE.—"J. E." writes:—"I shall be glad if you will oblige me with information as to the steps to take to get the diploma for Sanitary Science."

Answer.—If our correspondent wishes to obtain the diploma in Practical Sanitary Science, which is granted after examination by the Sanitary Institute, he should procure and study the following books, viz.:—Reid's "Practical Sanitation," price 6s.; Balfour Stewart's "Lessons in Elementary Physics," price 4s. 6d.; Roscoe's "Chemistry;" Macmillan's "Science Primers," price 1s.; Geikie's "Geology;" Macmillan's "Science Primers," price 1s.; Rideal's "Water and its Purification," price 6s.; Allen's "Building Construction," price 12s. 6d.; Buchan's "Plumbing," price 3s. 6d.; Vacher's "Healthy Homes," 2s. 6d.; Spinks' "House Drainage Manual," price 5s.; Maxwell's "Ventilation, Lighting, and Heating," price 2s.; also "Model Answers to Examinations for Sanitary Inspectors," price 2s. Any of the books named may be obtained from the Sanitary Publishing Company on receipt of the published price.

965.—PUMPS: BOOKS ON RECOMMENDED.—"J. E." writes:—"Could you tell me of some inexpensive book on the construction and principles of working of ordinary pumps, such as are generally used in rural districts for drawing water from wells from 6ft. to 40ft. deep?"

Answer.—Either of the following books will be found to serve the purpose required by our correspondent, viz.:—(1) "The Pump Fitters' Guide: For Calculating and Fixing Pumps," by John Eldridge, price 1s.; (2) "Pumps: A Practical Handbook on Pump Construction," by Philip R. Björling, price 5s. Copies may be had from the Sanitary Publishing Company on receipt of the published price.

966.—NEW SYSTEM OF SEWERAGE: CONNECTION OF HOUSE DRAINS.—"R. R." writes:—"There has been a new system of drainage carried out in our town recently, and the Drainage Committee of the Corporation are making charges to owners of property for connections to new sewers, and also for interceptor and chamber in the public roadway. Formerly the drains from these houses emptied into the canal upon which they abutted. Have the Authorities the power to compel payment for this work? To my mind the canal was to all intents and purposes a common sewer. Am I right?"

Answer.—Whether the canal into which the houses drained was a sewer would be a question of fact for the decision of the magistrates. With the information before us we are unable to advise. Are the Local Authority carrying out the connection of the houses to the new sewer by agreement under which the owner undertakes to pay the prescribed amount? Or have they served statutory notices upon the owners under Sec. 23 of the Public Health Act, 1875, to provide sufficient drains and connect them with the sewers, and on the owner's default the Authority are doing the work? If a copy of the notice (if any) which has been served were furnished us we should be better able to advise.

967.—DISINFECTION OF HOUSES: RE-PAPERING OF WALLS.—"Variola" writes:—"The Infectious Disease (Prevention) Act is in force in this town, and I am in the habit of issuing a notice to the owners of houses in which there has been infectious disease to re-paper and whitewash walls and ceilings respectively, and the work has been carried out. What power has the Medical Officer of Health to legally enforce these notices? Can it be done under Sec. 5 of the above Act, in which the words 'cleansing and disinfecting' are constantly used? I know the re-papering is insisted upon in several towns, but I am informed the Corporation in these towns allows about 5s. per room for the material, the owner finding all labour. My argument would be that re-papering and whitewashing, together with stripping off the paper, is a necessary part of the disinfection and cleansing, but I should like your opinion as to whether this argument would be likely to stand. I cannot find any cases on the subject, and would feel very grateful for any information you can give."

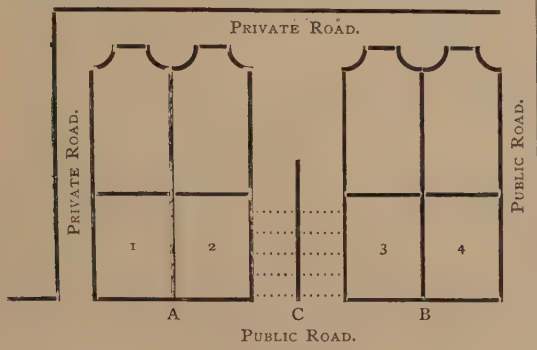
Answer.—In our answer to a similar Query 845, in our issue of November 5th last, which had reference to proceedings under Sec. 120 of the Public Health Act, 1875, we expressed a doubt as to whether a Local Authority could enforce a notice requiring the walls of a room to be re-papered after a case of infectious disease, and we were influenced in forming our opinion by Sec. 121 of the Act, which provides that "any Local Authority may direct the destruction of any bedding, clothing, or other articles which have been exposed to infection from any dangerous infectious disorder, and may give compensation for the same." It may be noted that the corresponding provisions in Secs. 5 and 6 of the Infectious Disease (Prevention) Act, 1890, differ considerably from Secs. 120 and 121 of the Act of 1875, and we do not think the same objection could be raised in enforcing notices for the destruction of wall paper under the later Act as under the earlier one. We do not know of any decided case bearing directly on the point. The practice of requiring the walls to be cleansed by the removal of paper is one which is required by a large number of Authorities, and we think, in case of proceedings for the recovery of expenses, under Sec. 5 (2) of the Act of 1890, that magistrates would be influenced by the evidence of the Medical Officer of Health (which should be offered) that the stripping of the walls and re-papering was a necessary act for the efficient cleansing and disinfection of the room or rooms, and that expenses so incurred would be reasonable.

968.—BUILDING BYE-LAWS: AUTHORITY IN DEFAULT: APPEAL TO LOCAL GOVERNMENT BOARD.—"Z." writes:—"What means are there of making a Sanitary Authority enforce its bye-laws? A certain borough having bye-laws and a surveyor allows houses to be built without proper foundations or damp-proof course. Stoneware drains are allowed to be laid under houses without concrete, and no test for soundness is applied, and other matters contrary to the Public Health Acts are permitted to be done. The ratepayers are remiss on the subject, and will not elect councillors pledged to enforce the bye-laws. Would an appeal to the Local Government Board be of any service?"

Answer.—Under the circumstances named we are of opinion that the most effective way to secure observance of the bye-laws would be to make a complaint to the Local Government Board under Sec. 299 of the Public Health Act, 1875, that the Local Authority has made default in enforcing the provisions of the Public Health Act and Bye-laws made thereunder. The complaint may come from any person. It should be in writing upon folio foolscap paper, addressed to the President of the Local Government Board, under cover addressed to the Secretary, and should state with as much conciseness as practicable the facts of the case which show the default of the Authority, and should offer proof of the complaint. The complainant would do well to be provided with evidence from a number of persons, and whose evidence could be thoroughly relied on. The Board upon receipt of the

complaint will probably communicate it to the Local Authority for their observations and explanations. If no redress is obtained, and the Board deem the matter of sufficient importance to require further proceedings, they may cause an inquiry to be held by one of their Inspectors, when evidence will require to be tendered before him in support of the complaints. If the facts be as stated by our correspondent, complaint to the Local Government Board is most desirable.

969.—Building Bye-laws: Power to Disapprove Plans.—"W. C." writes:—"Will you kindly inform me whether a Local Authority would have power to refuse to allow a building to be erected under the following circumstances? The Model Bye-laws are in force:—



A and B are two blocks of houses which formerly belonged to two owners. They now belong to one owner, who wishes to utilise the open space C between the buildings by constructing a shop and two bedrooms over, for the use of, and to be thrown into, No. 2 house. The open space at present is occupied by steps, which lead to the basement of the buildings, but these are never used, as there are entrances in the fronts. There are no windows abutting."

Answer.—The block plan sent is not sufficient for us to properly advise. A copy of the deposited plans would have assisted us. We are unable to tell from the plan what area of the site is to be covered with the proposed building, and whether the required open space at the rear will be provided. Assuming, however, that the specified open space can be provided, and that the other requirements of the bye-laws as to thickness of walls, drainage, &c., are complied with, the Local Authority will not be enabled to prevent the owner from erecting the proposed building.

970—Inspectors' Examination of Sanitary Institute: Books Required.—"J. H." writes:—"I am intending to sit for Sanitary Inspectors' examination. Will you kindly inform me what books I shall require, and the prices of same?"

Answer.—The following books are recommended, viz.:—Reid's "Practical Sanitation," price 6s.; Buchan's "Plumbing," price 3s. 6d.; Spinks' "House Drainage Manual," price 5s.; "Model Answers to Questions set at the Inspectors' Examination of the Sanitary Institute," price 2s.; Vacher's "Food Inspector's Handbook," price 2s. 6d.; and Vacher's "Healthy Home," price 2s. 6d. All the books are obtainable post free from the Sanitary Publishing Company. As we have previously pointed out in these columns, candidates for Sanitary Inspectors' examinations are much more likely to obtain success by placing themselves under the tuition of a good professional "coach"—several of whom advertise in our pages—than by indiscriminate and unaided study.

971.—Bacteria Tanks: Mode of Construction.—"A. K. B." writes:—"I am much obliged for your reply to my Query 951 in your issue of the 4th inst., but there is a special question with reference to bacteria filters for private houses, which is, that, inasmuch as the sewage flow from them is very intermittent and irregular in quantity, I have been recommended to construct a filter 3 yards square by 4ft. deep, but this might get filled in three hours or it might take three days. There is, of course, no difficulty in arranging for the overflow going into another filter, either with or without automatic arrangements. But the point is, will this irregularity injure the efficacy of the filter? Do the bacteria work when the filter is full or when it is empty, and are they liable to be drowned by a prolonged immersion during slow filling? Also is the same time for aëration required after a quick as a slow filling?"

Answer.—As we pointed out in our former reply, it is advisable to construct the filters in duplicate. They should, moreover, be so arranged that the flow into a tank should not be continuous for a longer period than 12 hours. The intermittency of application of the sewage is requisite in order that the bacteria may attack the sewage when in contact with the filter, and that they may also obtain the requisite supply of oxygen when the filter is emptied. A prolonged period of filling will probably be found to necessitate a proportionately longer rest period than when the conditions are reversed. Automatic discharge of the filter can be provided by the construction of a syphon in a chamber having direct connection with the filter, and this may often be found advantageous. We will endeavour to advise further if required.

Contracts Open.

The dates given below are the latest up to which tenders can be received.

Bury (Lancs), February 21st.—Sewer.—Mr. J. Cartwright, borough engineer.

Dover, February 22nd.—Sewers.—Mr. Henry E. Stilgoe, A.M.I.C.E., Town Hall, Dover.

Hunslet (near Leeds), February 28th.—Sewerage Works.—Mr. Sam Shaw, C.E., Dewsbury.

Basford (Notts).—February 21st.—Sewerage Works.—Mr. Herbert Walker, Newcastle-chambers, Nottingham.

Burnley.—February 21st.—Scavenging.—The Sanitary Inspector's Office, Yorkshire-street, Burnley.

Newton-in-Makerfield.—February 21st.—Sewers.—Mr. Richard Brierley, engineer and surveyor, Town Hall, Earlestown.

Wigston Magna (Leics).—February 21st.—Scavenging, &c.—Mr. W. G. J. Clark, sanitary inspector to the Council, 32, Bell-street, Wigston Magna.

Rathdown (Ireland). February 23rd.—Drainage.—The Registrar's Office, Dean's Grange Cemetery.

St. Austell (Cornwall).—February 23rd.—Drain Pipes.—Mr. M. Spear, highway surveyor, St. Austell.

Denton (Lancs).—February 24th.—Sewer.—Mr. G. H. Newton, surveyor, Market-place, Denton.

Eccles (Lancs).—February 24th.—Sewerage Works.—The Borough Engineer, Town Hall, Eccles.

Llangyfelach (Wales).—February 28th.—Removal of Refuse.—Mr. G. B. Haynes, clerk, 8, Fisher-street, Swansea.

Ripon.—February 28th.—Sewers, &c.—Mr. H. A. Johnson, civil engineer, 14, The Exchange, Bradford.

King's Lynn.—March 2nd.—Sewers.—Mr. E. J. Silcock, C.E., borough engineer, King's Lynn.

Litherland (Lancs).—March 2nd.—Removal of Nightsoil.—Mr. W. B. Garton, surveyor, Public Offices, Sefton-road, Litherland.

Oldham.—March 2nd.—Sewers, &c.—Mr. S. A. Pickering, A.M.I.C.E., borough surveyor, Oldham.

Vacancies.

ASSISTANT SUPERINTENDENT OF SEWAGE WORKS (LONDON, N.W., February 22nd).—For the Willesden Urban District Council. Salary, £2 per week with residence. Mr. O. Claude Robson, engineer, Public Offices, Dyne-road, Kilburn, N.W.

CLERK OF WORKS (SOUTHAMPTON, February 19th). For the Southampton Harbour Board. Salary, £3 3s. per week. Mr. A. H. Skelton, clerk, Harbour Offices, Town Quay, Southampton.

INSPECTOR OF NUISANCES, &c. (MILFORD HAVEN, February 19th).—For the Urban District Council. Salary, £60 per annum. Mr. Thomas H. Lewis, clerk, Council Office, Milford Haven.

SANITARY INSPECTOR (LONDON, W.C. (March 8th). For the Holborn Board of Works. Salary, £120 per annum. Mr. Matthew H. Hale, clerk, Holborn Town Hall, Gray's-inn-road, W.C.

SURVEYOR (LONDON, W., March 7th).—For the Vestry of St. Marylebone. Salary, £600 per annum. Vestry Clerk, Court House, Marylebone-lane, Oxford-street West.

SURVEYOR, &c. (MASHAM, YORKS, February 26th).—For the Urban District Council and Urban Sanitary Authority. Salary, £50 per annum as Surveyor, £25 per annum as Inspector, and £15 per annum as Collector. Mr. John H. Calvert, clerk, Masham, R.S.O., Yorks.

SURVEYOR, &c. (MAYBOLE, SCOTLAND, February 21st).—For the Maybole Burgh Commissioners. Salary, £120. Mr. James Gibson, solicitor, Maybole, Clerk to the Commissioners.

SURVEYOR'S ASSISTANT (BURTON-UPON-TRENT, February 19th.)—For the Corporation. Salary, £120 per annum. Mr. George T. Lynam, borough surveyor, Town Hall, Burton-upon-Trent.

COMPETITIONS.

WINCHESTER, February 28th.—Public Baths.—Full particulars, with plan of site, to be obtained on deposit of £1 1s. on application to the City Surveyor, Guildhall, Winchester, which will be returned on receipt of a *bonâ fide* set of plans. Premiums of £25 and £15 will be awarded for the designs adjudged by the Council of sufficient merit, and placed first and second in order respectively. Drawing and detailed estimate to be deposited at the office of Mr. Walter Bailey, town clerk, Guildhall, Winchester.

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NOTICE.—On and after 31st March next the Annual Subscription to this Journal will be raised to 12s. 6d. to all NEW Subscribers. NO ADVANCE will be made to our friends whose names are entered on our Subscription list prior to that date, so long as they continue to subscribe.

THE

Sanitary Record,

FEBRUARY 25, 1898.

SEWER VENTILATION AND ITS ATTAINMENT.

An important conference of metropolitan Surveyors and Medical Officers of Health has been convened by the London County Council for this day (Friday), to consider the question of sewer ventilation. It is to be hoped that some practicable means may be suggested to reduce this crying evil, the continuance of which is a discredit to Sanitary Authorities and their officials. The subject was one which came up for discussion at the meeting of the Incorporated Association of Municipal and County Engineers held at the Institution of Civil Engineers on Friday last, with a view to an agreement being arrived at amongst metropolitan surveyors, but there appeared to be such a divergence of opinions amongst them as to remedies to be suggested at the conference that in so far as surveyors are concerned we doubt whether any good will come of it.

It was suggested at the meeting referred to that the difficulties in regard to sewer ventilation had been brought about by the inability to ventilate sewers by means of house drains and the provision of disconnecting traps on house drains, and it was urged by some speakers that this system had been brought about owing to the theories of Medical Officers of Health.

We have no desire to bepraise the services of one class of municipal official over that of another, but on the subject of sewer ventilation and in protecting the health of householders, we are bound to admit that the Medical Officer has shown himself superior to the surveyor. We would go even further than this, and state that, in our opinion, the remedy for reducing the sewer gas nuisance is more a question for chemists and Medical Officers of Health than for surveyors. The discussion at the meeting referred to resulted in two propositions being submitted : — (1) That the ventilation of sewers should be carried out by increasing the number of open gratings in the surface of roads; and (2) that as an aid to the ventilation of sewers dwelling-house owners should be required to carry up ventilating shafts by a connection with the house drain on the sewer side of the disconnecting trap.

Neither of these proposals, we think, reflect to the prestige of engineers, but both are, in our opinion, impracticable of attainment. The free ventilation of sewers is an old theory, and has been tried long ago and abandoned. True, if it were possible to construct sewers in the form of open channels or culverts, and protected if necessary by continuous gratings, the offensiveness of fresh sewage would be small at or near the heads of sewers; but sewage quickly decomposes, and while those living in the upper district of a town would discharge their sewage quickly and at little nuisance to themselves, those living in the lower parts would have to suffer from the decomposing sewage sent down past them. The fallacy of the open sewer argument is well shown in regard to some of our rivers, such as the river Aire at Leeds, and many others we could name, which receive volumes of sewage, but which are positively dangerous to health from the filthy odours given off from their surface. And if this be the case in open streams where the sewage is largely diluted by fresh water, what would be the case in regard to open streams of undiluted sewage?

The second proposal as to ventilating the sewers by means of shafts contiguous to houses, and laid at the cost of owners of property, is also, we fear, an equally impracticable proposal. In the first place, Local Authorities are required by statute to ventilate their sewers and maintain them so as not to be a nuisance. Ventilation of sewers should, we maintain, be effected in themselves, and such a retrograde step as endeavouring to shift the task on to owners of property will not be sanctioned by any legislative body. Moreover, the system is open to most serious objection from a sanitary point of view. Intercepting traps are provided for

the purpose of locking out sewer gas from the neighbourhood of houses, and so that in the case of a house drain being defective, the danger of admission of sewer air by this means is limited to that manufactured in the house drain itself. To advocate, therefore, that the owners of property must be put to the cost of providing intercepting traps to exclude sewer gas from houses, and at the same time to require them to bring it up to the house by another channel, the soundness of which can be guaranteed for only a limited time, is a species of folly which is engendered, it is to be feared, by over-zealous officialism which approaches subjects from one point of view only, and that of the Local Authority. The health of the community should, we need scarcely point out, have prior consideration; but in this case it has evidently, we think, been overlooked.

The efficiency or otherwise of high ventilating shafts was discussed at the meeting, and there appeared to be much confusion of opinion as to the value of these, Mr. Norrington, explaining the results of his experiments to test their power of extraction, from which it was shown that they were practically useless, while it was contended, on the other hand, with far from conclusive evidence, that such shafts were useful.

With regard to the contention of one or two surveyors, that intercepting traps on house drains should be abolished, we have no sympathy whatever. A drain without an intercepting trap is like a house without a door, and is open to admit evil associations of sewer gas, which, in the event of any part of the house drain being defective, would suffuse the dwelling with it. A very forcible illustration of it has been frequently shown where in the case of houses not provided with intercepting traps, and where indoor w.c.'s required repair, the plumber has removed the trap of this apparatus when the heated air of the dwelling has acted as an exhaust ventilator for the sewer, with most serious results to the occupiers.

The remedy for the ventilation of sewers will have, in our opinion, not to be looked for from surveyors. The question is one which belongs, as we have already pointed out, to the domain of the chemist and the Medical Officer of Health, and we venture to suggest that the only effective remedy lies in preventing by chemical means the decomposition of sewage, and at the same time by disinfection of the sewer air before it is allowed to pass out into the open air. This is the consummation to be arrived at, and the sooner that engineers and surveyors will concede it the sooner will it be reached, and their difficulties in connection with sewer ventilation be lessened.

Notes.

A Royal Commission.

An announcement of the utmost importance was made in the daily Press, towards the end of last week. The public was informed that the Government have decided to appoint without delay a Royal Commission to inquire into the bacterial treatment of sewage. This important decision has been arrived at on account of the pressure brought to bear by influential Sanitary Authorities. The remarkable success of the experiments at Exeter, Leeds, Sutton, and other towns, has also moved the Government to action. This action on the part of the Government is peculiarly satisfactory to us, seeing the important part we have been enabled to take in laying the result of investigations and labours of Mr. Dibdin and others before our readers. In our "Review of 1897" we ventured to predict that a "parting of the ways" had been reached in the treatment of this great and important question. But even the most ardent advocate of bacteriological treatment could scarcely have hoped for so early a recognition of the value of his researches. We shall await further announcements with interest.

Mechanical Filtration.

The article on "Mechanical Filtration," from the pen of Mr. Bristowe, which appears in our columns this week, together with the examples of what the process of which he is the able exponent has done, and which we present in the form of a supplement, should lead many of our readers to take a more active interest in a system of purifying sewage, polluted streams, trade effluents, &c., which, as Mr. Bristowe states, "is still most wrongly judged by many scientific experts." The E. H. Riddell system is one that combines efficiency and economy in a very remarkable way, and wherever it has been adopted most gratifying results have ensued. Many of the largest works in the Midlands have adopted the system, and it is from some of these that the samples of effluents—from dye works, paper mills, and woollen mills—we illustrate are taken. The sections represent the colours when the bottles are held to the light. We may add that we are indebted to Messrs. L. Hugh Bristowe and Co. for permission to utilise them, and also for an opportunity of personally investigating the system, which investigation, we are bound to say, has completely converted us to the cause of "Mechanical Filtration for Trade Effluents," as exploited by the E. H. Riddell system. In a future issue we shall illustrate and describe an installation of this process.

Sanitary Inspectors at Dinner.

Everybody concerned had cause for congratulation over the Annual Dinner of the Sanitary Inspectors' Association at the Holborn Restaurant on Saturday. There was a splendid attendance, the affair was exceptionally well organised, the *menu* and wines were good, and the speeches of a very high order of merit. Presentations were in the air and pleasant surprises were the order of the hour. Mr. Tidman, the energetic secretary, was, like Niobe, "all smiles." Our only regret was that we had to leave before it was all over, unwittingly foregoing our pleasant duty of responding for the Fourth Estate.

The Improvement of Westminster.

The Bill which it is intended to introduce in the present session of Parliament to empower a syndicate to acquire the thoroughfares of Millbank-street and Abingdon-street, to construct an embankment to the Thames, and to erect in place of the existing

old houses in that locality blocks of handsome, substantial modern buildings, is exciting considerable interest and opposition in the metropolis. The Westminster Vestry and the Chapter of Westminster are alike opposed to the Bill, and a good deal of opposition may be expected from other quarters. At a recent meeting of the inhabitants the fear was expressed that the Bill would be the means of driving a number of poor people from their homes, that many picturesque and interesting old houses would be destroyed, and above all, that the scheme would cost a very large sum of money. The case for the opponents to the scheme has been very vigorously argued by a writer in the *Pall Mall Gazette*, who fittingly puts his position as this—that the proposal is one to enable a company of speculators to make money, by converting a quarter where at present poor people live into a quarter where it is hoped that rich people will come to live.

Sanitary Aspects of the Scheme.

No one will deny that, as things are, the approach to the House of Lords from the south is not in keeping with the stately character of Westminster. Many of the old houses in Millbank-street are already falling into decay, and their demolition is simply a question of time. It is said that if things are allowed to go on as at present, these picturesque old houses will in the course of time come to be replaced by houses which, while retaining most of the disadvantages, will lose all the old charm of their predecessors. Then it is stated that the area is insanitary, and the preamble to the Bill sets forth that the scheme is conceived in the interests of the public health. Any scheme that is so conceived has, of course, our hearty approbation, but in the present instance one is inclined to regard this plea with a certain measure of caution. When a syndicate of private capitalists enter upon a scheme of "improvement" it is but natural to suppose that their dominating motive is not so much anxiety for the public health as the desire to promote a successful commercial venture, and to secure for those interested as handsome a return as possible.

Dangers of the Bill.

While, then, it will be readily admitted that there is great need for improvement of the vicinity of the Houses of Parliament, care must be taken to see that that improvement is carried out on the right lines. The proposal, if properly conceived, should effect a great change for the better. Even without going so far as to allege that the present locality is actually insanitary, there can be no doubt that there is abundant room for an improved sanitation, and a scheme of wholesale reconstruction would present an admirable opportunity for introducing modern sanitary methods and ideas where under existing circumstances they are hardly to be looked for. But we are by no means sure that these improvements, as proposed to be effected by the company who are promoting the Bill, would be such as to be most in the public interest. The writer in the *Pall Mall Gazette* expects that they will erect magnificent blocks of high-rented flats or monster hotels on sites which are of national importance; and though he probably goes too far in saying that such erections would be a disfigurement to Westminster, the citizens have a right to expect something better on such a site than buildings that would obviously be designed in the spirit of a profitable commercial enterprise.

An Alternative Proposal.

A very attractive modification of the proposed scheme is sketched by Mr. H. W. Brewer in last week's *Graphic*. He suggests that the street of 90ft. wide, which is to start from near the Victoria Tower and enter Horseferry-road 70 yards west of Lambeth Bridge, should be made to curve slightly to the east, so as to join Horseferry-road at the foot of the bridge itself. In the space between it and the proposed embankment there would be a long, narrow strip, which, instead of being covered with huge buildings which would shut out the view of the river and the Houses of Parliament, might be laid out as ornamental garden ground, forming a continuation of Victoria Tower Garden, from which it would be separated by a short road leading to the Embankment. Some such scheme as this was suggested by Sir Charles Barry in 1857, though on a larger scale. Mr. Brewer illustrates his idea by a sketch which certainly looks a wonderful improvement on the present aspect of the thoroughfare. It possesses the merit of opening up a noble view of the towers of Westminster, with a foreground of gardens, and would provide for a really worthy approach to the seat of Imperial Government.

Safeguarding of Water Supplies.

At the quarterly meeting of the Birmingham and Midland branch of the Incorporated Society of Medical Officers of Health, a very valuable paper was read by Dr. Bostock Hill on "The Safeguarding and Examination of Public Water Supplies." An interesting discussion ensued, as the result of which the following resolution was adopted:—"That in view of serious dangers to public health which may arise from the pollution of public water supplies, statutory power should be given to Sanitary Authorities to periodically inspect and take samples from the waterworks from which their districts are supplied." Of course, the warning afforded by the epidemic at Maidstone was referred to in the discussion as the "shocking example." The good people of that now notorious town will derive what consolation they can from the thought that their misfortunes have at least served this good purpose of awakening the people of the country at large, and Sanitary Authorities in particular, to a sense of the grave responsibilities that attach to the jealous preservation of our water supplies from the slightest possibility of the taint of pollution.

Food Products Adulteraton Bill.

The Council of the Society of Public Analysts, in their report on the Food and Drugs Bill of last year, give expression to their dissatisfaction that the draft Bill introduced by the President and Secretary of the Local Government Board did not embody the most important recommendations of the Food Products Adulteration Committee, the bulk of which should have been embodied in the Bill. The most impor-

tant of these recommendations—that referring to the foundation of a Court of Reference—the Council lay particular stress on. The Court of Reference, they think, should be constituted substantially on the lines laid down in the report of the Select Committee, with this modification, that it should include in its number one or more public analysts. Unless these points are attended to, the measure will not, in the opinion of the Council, do much to remove the difficulties that are at present experienced in carrying out the existing Acts.

The Paris Exhibition, 1900.

The Government have agreed to ask Parliament for a grant of £75,000 to provide for the expenses connected with the British section of the Paris Exhibition of 1900. The amount of the grant can hardly be said to err on the side of liberality; compare with it, for instance, the example of the German Government, which has sanctioned a grant in aid of 5,000,000 marks, or about £250,000. The Prince of Wales is the President of the Royal Commission for the Exhibition, and at the first meeting of the Commission, held at Marlborough House last week, his Royal Highness expressed the hope that the Treasury would be prevailed upon to considerably augment the grant, as the sum promised would hardly prove sufficient or adequate. The Exhibition, he said, was to be carried out on a scale of magnificence never before approached even in Paris, and the important influence it was expected to have on the industry and art of this country was indicated by the comprehensive character of the British Commission. A distinctive feature of the forthcoming Exhibition will be that the exhibits will be classified according to their character, instead of being grouped according to the countries which they represent, so that the products of any one kind, no matter from what part of the world they come, may be seen and compared together. It is to be hoped that due prominence will be given to the sanitary appliances of the day. They should form a most interesting exhibit, and we trust that British exhibitors will be well represented.

Threatened Pollution of Loch Katrine.

A detachment of Lanarkshire Volunteers have selected as the field of their Easter Manœuvres the country around Loch Katrine, from which the water supply of Glasgow is derived. An alarmist, writing to the Press, has pointed out the danger, involved in this proposal, of pollution of this famous water. It is true, no doubt, that the place is visited by thousands of tourists every summer; but at Stronachlacher Hotel, the only place on the loch where they stop, the sewage is carefully pumped up to specially-prepared filter beds on the hill, and the steamers are not allowed to discharge their sewage into the loch. The Volunteers will be placed, it is supposed, under no such restrictions. They will not live in the hotel; and as they may be expected to spend a good deal of their time on the lake in boats, there is a danger that a considerable amount of liquid and solid filth may find its way into the Glasgow drinking water. We trust, however, that the Authorities in charge of the manœuvres will have their eyes open to this risk, and will take sufficient measures to prevent its being incurred.

Public Health in Parliament.

The Home Secretary stated in the House of Commons, on Thursday of last week, that thirty-seven cases of lead poisoning, occurring in factories and workshops amongst boys under eighteen years of age, had been reported in 1897, two of which were known to have ended fatally. He added that the whole subject of lead poisoning was receiving his earnest attention, although he was not yet prepared to make any statement as to the steps which would be taken as to the process. Mr. Long, President of the Board of Agriculture, on the same occasion gave statistics showing the decline in the reported cases of rabies in Britain, since the muzzling regulations were put in force. The number in 1896 was 438, and last year 151, and this year only five cases are known to have occurred—a result which the Board regard as very satisfactory.

The Plague in India.

The plague in Bombay continues to spread. The deaths from this cause last week numbered 1257, an increase of 144 on the returns of the previous week. Among the latest victims we regret to record the death of Miss Florence Eva Morgan, acting lady superintendent of the General Plague Hospital and Nursing Establishment, who caught the infection and died on the 14th inst. As an indication of the effect being produced upon the course of business by the alarming ravages of the scourge, we hear that one of the Exchange banks issued a notice a short time ago to their customers suggesting that they should curtail their business with Bombay as much as possible; and now they have issued another circular, stating that, in consequence of the rapid spread of the plague, business with the Bombay Presidency should, in their view, be restricted as far as possible in view of the difficulties that may be anticipated in obtaining the payment of bills. Everything is getting thoroughly demoralised, and as yet there hardly seems to be a ray of light or hope. In spite of all the discouragement, however, the Government are keeping their heads perfectly cool.

The Influenza.

From the Registrar-General's return we learn that the influenza still rages in the metropolis with fatal results. Its latest influential victim is Mr. Wootton Isaacson, M.P. for Stepney. The doctors report a large number of patients down with the "grip," and many distinguished people are among the sufferers, but it may be hoped that the malady in a fatal form has begun to wane. There were only 87 deaths in London last week as compared with 98 in the preceding week, and 102 in the week before that. The figures therefore mark a distinct decline. In each of the last eight weeks there have, on the average, been just 70 deaths from influenza in London alone, the greater proportion being among elderly people. The epidemic has been the most severe that has been known for three years.

At a recent meeting of the Carnarvonshire Sanitary Inspectors' Association it was unanimously decided to amalgamate with the North-Western and Midland Association.

NOTES ON
PRACTICAL SANITARY SCIENCE.

By WILLIAM H. MAXWELL.

Assistant Engineer and Surveyor, Leyton Urban District Council, Author of "Drainage Work and Sanitary Fittings," "Ventilation, Heating, and Lighting," &c., Certificates of the Association of Municipal and County Engineers, and Sanitary Institute.

No. 50.—REFUSE DESTRUCTORS.

(Continued from page 165.)

Warner's Destructor.

Warner's[130] patent "Perfectus" destructor (Fig. 15), with its recent improvements, is one of the latest furnaces for burning house refuse, of which some 500 cells are now in use. This destructor is in operation at Hornsey, Bournemouth, Newcastle-on-Tyne, Winchester, Govan, Hyde, Royton, Bath, Southampton, and several other towns. In general arrangement it is very similar to Fryer's, but differs from it in having a special charging arrangement, consisting of a hopper with a movable bottom. A charge is put into the hopper and a plate put over it to prevent the escape of smoke and fumes. A lever is then moved which releases the bottom door and allows the refuse to fall on to the drying hearth. Another important improvement is the provision of dampers to the flues of each furnace, which can be closed during the process of clinkering, and so keep up the heat of the furnace during the operation. Special dust-catching arrangements are also included in the design, and sometimes forced draught produced by a powerful fan is applied.

One of the latest installations of Warner's Destructor is that laid down at Bath. These works have recently been described at some length in *Engineering*[131]. The refuse is tipped into feeding hoppers, which consist of rectangular cast iron boxes. There is a flap door upon an axis at the lower part, the door being controlled by iron levers. When it is required to feed in refuse, the lever is thrown over, and the contents of the hopper fall immediately on the hearth beneath, and the door is at once closed again. It is desirable that when the operation of charging is to be performed the door should be open as short a time as possible, to prevent the admission of cold air into the furnace at the back end, a consequence which leads to the cooling of the gases evolved, and also to paper or light refuse being carried into the flues.

The *furnaces* or *cells* are each 5ft. wide and 11ft. deep. The part where the refuse first falls constitutes a drying hearth, whilst the lower part has *rocking grate bars*, as shown, and here combustion takes places. The furnace doors in front are of the sliding type, and are constructed of cast iron with hollow backs, to allow of the attachment of baffled plates. Holes are made to give a small amount of air, and to provide a cooling effect.

Over the grate and the drying hearth there is turned a reverberatory firebrick arch which has openings for the exit of gases at the sides, as shown in the figure. These openings are fitted with flap dampers, which are operated by horizontal spindles passing through the brickwork to the front of the furnaces, where they are fitted with levers. In this way each cell may be operated independently of others, a feature which enables each workman to manage his own furnaces independently of the others—and the fires can be thus kept in better condition; besides which it affords a safeguard against dust getting into the chimneys and flues. When the dampers are closed, cold air is prevented from passing under the reverberatory arch and into the flues. The heated gases or products of combustion are taken by flues to the boiler-house, where they are used for generating steam.

At Royton four of the Warner cells are in use and are aided by a "cremator" heated by oil. The consumption of refuse here is equal to about five tons per cell per twenty-four hours, but this type of furnace will destroy up to about eight tons, according to the nature of the material. The clinker produced is equal to about 25 per cent. of the refuse.

Fig. 16 shows a recent improvement in arrangement of Warner's furnace, with the view of increasing its steam-raising capabilities. It will be seen that a forced draught has been introduced, and a tubular boiler is shown placed close to the cells instead of at some distance away in the main flue, as at Bath, &c. Mr. Richards, the city surveyor of Sydney, N.S.W., has recently reported favourably upon the furnace for dealing with the refuse of that city. The following extract from the *Sydney Morning Herald*, October 7th, 1897, gives some of the details of the report, and will be of interest in this connection:—The first of a series of reports by the city surveyor of Sydney, on the treatment and destruction of refuse, &c., in Europe was presented at a special meeting of the City Council held in October, 1897. This report is devoted almost wholly to methods employed for destruction of refuse, garbage, &c. Mr. Richards reports to the City Council that on his visit to England he "soon became aware that all England, in fact municipal authorities from all parts of the universe, were seeking to learn what destructor was doing the best work in England." After communicating with and interviewing surveyors and engineers who were regarded as amongst the best authorities in England, with many years' experience in such work, Mr. Richards selected from their advice, coupled with other information, the cities in which the most modern destructors were in use, and in his travels he visited no fewer than forty-five cities and towns. He visited and inquired into works at Manchester, Bury, Oldham, Royton, Cambridge, Hornsey, Southampton, Bournemouth, Eastbourne, Cardiff, Glasgow, Edinburgh, Leeds, St. Luke's, Lambeth, Kensington, Westminster, Cheltenham, Islington, Deptford, Leyton, Salford, Hampstead, Newcastle-upon-Tyne, Nottingham, Sheffield, Rochdale, St. Pancras, Battersea, Birmingham, Liverpool, Govan, Great Yarmouth, Bradford, Bristol, Huddersfield, Hyde, Warrington, Paris, Berlin, Dresden, Leipzic, Winchester, Vienna, and Brussels.

After describing the works in operation at various towns and cities visited by him, Mr. Richards says:—

"The real value of a destructor is that, however clumsy and costly the plan of burning refuse may be, it is at any rate effectual as a means of getting rid rapidly and completely of a readily decomposable, and therefore dangerous matter.

[130] Patent No. 18,719 (1888).
[131] January 3rd, 1896.

With proper destructor power and efficient daily collection of refuse, it should always be possible to get rid of dangerous material within twenty-four hours, before it has time to ferment and develope its peculiar powers. In no other way can this be done with so much certainty or so quickly as by fire. There is also this further advantage, that by so dealing with about one-third of the refuse we render another third saleable, and the remainder harmless. And the cost of this advantage is one shilling per ton on one-third of the refuse—fourpence per ton on the whole. Surely not an extravagant price! The free use of destructors seems to me the most efficient and safest mode at present known of doing this work and doing it effectually, and the Council would be prudent in making themselves safe by adopting it, and the sooner the better. That properly managed they need be no nuisance has been abundantly proved. Wherever they have been put in action prejudice has died out by degrees, and the anticipated disagreeables have not proved realities. That they should be considered of enough importance to be mentioned in comparison with the health of the city is un accountable."

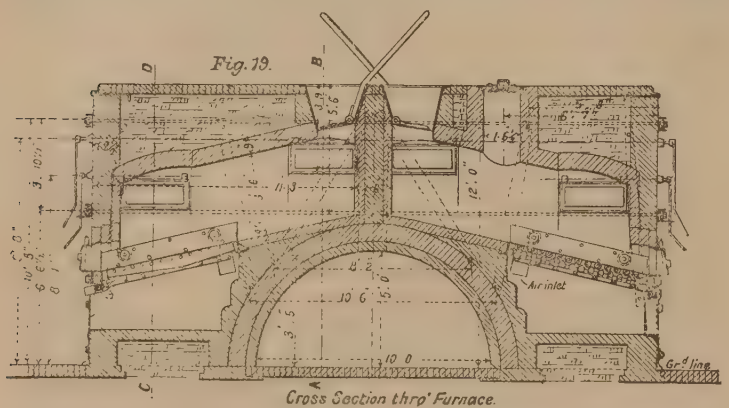


Fig. 15.—Section of Warner s Patent "Perfectus" Destructor.

While in England Mr. Richards called for tenders for the erection of a six-cell destructor in Sydney, the installation to consist of a six-cell destructor complete with all machinery and appliances, including clinker breaker and mortar mill. The shaft and primary arrangement to be of sufficient capacity for the further addition of six cells at any time after the erection of the first six that the Sydney Municipal Council may determine. The machinery to comprise one mortar mill, one clinker breaker, one engine, and feed pump for the boiler, large water tank, the shafting, belts and pulley for driving the various machines, and the steam pipes connecting the engine and pump with the boiler. The tender to include exhaust pipes and drain pipes from the steam cylinders. The contract to include the supply of all labour, tools, carriage, excavation, and cost of labour for working for six months, necessary to complete the whole of the works to the entire satisfaction of the city surveyor. All materials to be the best of their respective kinds and approved by the city surveyor or other authorised officer of the Sydney Municipal Council. Three tenders were received, namely, those from Beaman and Deas; Goddard, Massey, and Warner; and Manlove and Alliott (Fryer's). Beaman and Deas proposed a six-cell destructor with all fittings, boilers, shafting, in accordance with specifications submitted with all plant necessary for the electric lighting of the buildings at a cost of £9700.

Messrs. Goddard, Massey, and Warner's scheme includes six destructor cells complete, all brickwork for cells, buildings, flues, shaft, &c., two tubular boilers, valves, fittings on high-pressure steam engine for driving the mills and general machinery, one donkey-pump for feeding the boilers, vertical engine for driving the fans at such speed as may be necessary, one blowing fan, one tank (1000 gallons), an improved mortar mill for grinding clinker for mortar, one mill for breaking clinker suitable for footways and carriageways, shafting, pulleys, piping and

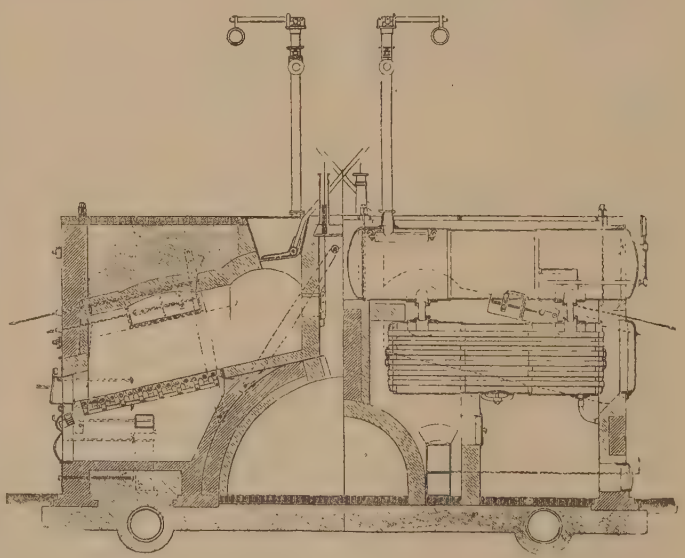


Fig. 16.—Warner's "Perfectus" Destructor with Boiler.

fixing same; chimney shaft, 150ft. high, with capacity for twelve cells; buildings consisting of brickwork and ironwork in the retaining walls, and roof work. Cost of works, £9580; electric lighting, £175; working for six months, £416.

Mr. Richards reports that Goddard, Massey, and Warner's scheme is the most suitable for the city of Sydney.

That firm undertakes to pay the same rates of wages for labourers and mechanics as are paid the day labour staff of the City Council, and engage local labour throughout. They are also prepared to allow the City Council to carry out any of the respective works in the event of the Council so determining, but they reserve to themselves the right of fixing and installing all the patented parts of the plant and appurtenances.

The conclusions arrived at by Mr. Richards are as follows:—That it is necessary in the interests of public comfort and health to at once establish means for the destruction of house refuse by fire. That the best and most suitable means for the treatment of Sydney's refuse is that by Warner's "Perfectus" patent refuse destructor. That for the whole quantity of house refuse collected twenty-four cells would be required. That street sweepings and gully soil may be turned to good account for top-dressing our reserves, parks, &c. That, with a view to the utmost economy, four refuse destructor depôts should be established—say, one Moore Park, South Sydney; one Ultimo, West Sydney; one near the vicinity of Kent-street North; and one at East Sydney, near Rushcutter Bay. That it would be advantageous for the Council to acquire and maintain stock and plant for cartage, not only of refuse, but for all purposes in city works; and that buildings for workshops, stabling, yarding of carts, &c., should be attached to each destructor. This is the custom in all important cities of England, and works very satisfactorily.

THE SANITATION OF DOMESTIC BUILDINGS.

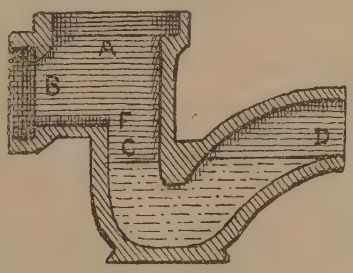
By Frank Latham, C.E., M. San. Inst., &c., Assistant Surveyor, Borough of Margate.

CHAPTER IV.

Section 2.

INTERCEPTION.

All communication between sewers and house drains should be cut off by means of a proper inter-



BUCHAN'S TRAP

Fig. 35.

cepting trap. In other words, in order to keep back from the houses any air out of the sewer, or air from one house drain, wherein there may be infection passing into the drains of another house, and thereby tending to spread the disease, an intercepting trap must be fixed, as otherwise all the house drains will be connected one with the other, and the sewers ventilated through the drains, by which means in time of an outbreak of infectious disease, contagion may perhaps spread through the defective drains and cause an epidemic. In cases where the interceptor is not used, it is tantamount to laying on the bad air from all filthy and neglected drains, including the line of sewers,

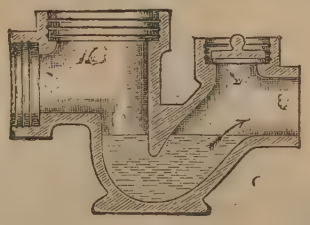
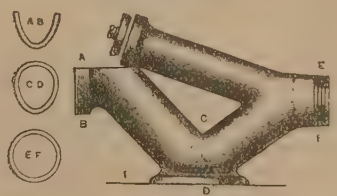


Fig. 36.

with the house drain, and all that is required is an outlet from imperfect work or an accidental fracture for the occupiers to have a plentiful supply of the mixture. The Model Bye-laws require such an intercepting trap to be provided between all sewers and house drains, with a pipe or shaft



"IMPROVED KENON"

Fig. 37.

carried up vertically on the house side of same, to act as an inlet air ventilator.

The intercepting trap should also without fail be used to disconnect the house drains from cesspools and similar receptacles, where there is no better method of drainage provided.

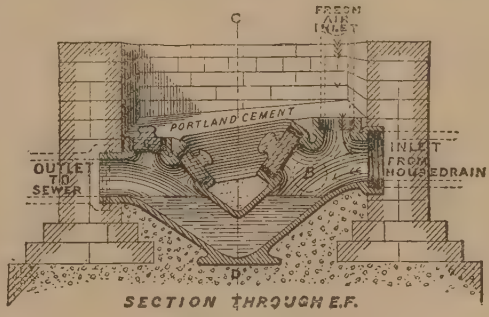


Fig. 38.

All intercepting traps should be of best glazed stoneware or iron, and at least one-twelfth the diameter of the trap in thickness, and free from any roughness or air-holes in the manufacture. They must be well shaped and with a water seal of 2½in. at the least. The interceptor should be set perfectly level, so as not to cause any undue impediment in the flow of sewage. Too large a trap should not be used, but a 4in. trap is sufficient for either a 4in. or 6in. drain and a 6in. trap for a 9in. drain.

Some of the principal intercepting traps used

are:—The "Buchan" trap, made by Messrs. J. and M. Craig, Ltd., as illustrated in Figs. 35 and 36, is one of the best forms of trap where no inspection chamber is used, as it can as a rule be kept clean and, if required, unstopped from the air inlet shaft, which should be at least 6in. in diameter. The

Fig. 39.

Improved Kenon" disconnecting trap, manufactured by Messrs. Crapper and Co., Fig. 37, is well designed to be used in an inspection chamber, as it affords a good raking arm into the sewer, and the mouth after leaving the open channel of the house drain, being egg-shaped, provides a deeper flow and better flush of sewage than others.

Sykes' patent interceptor is another ingenious production in connection with an inspection chamber, and when used no open channel is required, as the trap forms everything necessary, as will be seen by the following illustration (Fig. 38).

Winser's parallel intercepting sewer trap (Fig.

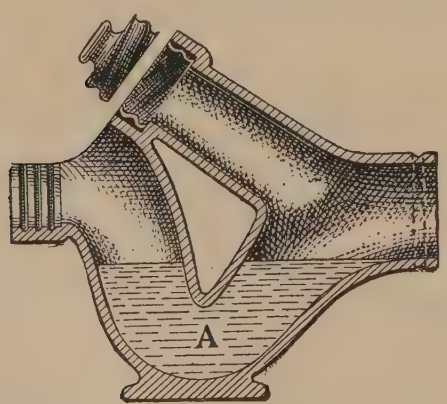


Fig. 40.

39), which has the inlet and outlet on the same level, is useful in cases where the fall between house and sewer is limited, and in all such cases an inspection chamber should be provided.

Fig. 40 shows a good interceptor, manufactured by the Albion Clay Company, Limited, a special feature being, that the raking arm is fitted with Sykes' Patent Screw Plug, which safely prevents the escape of sewer air into the chamber.

FROM WHENCE CAME THE FEVER TO LYNN?

DR. ST. GEORGE MIVART INVESTIGATES AND REPORTS.

LAST week we showed that, after careful inquiry, Dr. Mivart came to the conclusion that the blame for the advent of the epidemic could not be fixed either upon faulty sewerage and drainage, general sanitary conditions, or tainted milk supply. Having exhausted these possible sources of infection, he next proceeds to examine the arrangements for supplying the town with water. With the exception of some forty houses, or works, the whole of Lynn receives its water from the Corporation waterworks. This certainly simplifies matters in fixing the responsibility for any fault in the supply. There is no private company to denounce as working only for its own profit, with an utter disregard to the purity or otherwise of the supply. The Town Council alone is the responsible body.

As far back as 1892 Mr. W. Whitaker made a special report to the Waterworks Committee as to the source of the Gaywood river, from which the town's water is taken. Briefly, he states the supply is derived from springs that flow out of the base of the chalk, the water in which formation is held up by the underlying impermeable gault. "These streams are the result of the rainfall over the broad chalk tract rising to the east. Much of the water falling on the chalk sinks into it, and of this a part finds its way downward, until at some depth the chalk is saturated and can hold no more. The level of saturation varies roughly with that of the ground, being higher at the hills on the east than at the slope towards the outcrop of the underlying gault; the reason of the difference of level being the frictional resistance to the flow of the water through the chalk. The underground water-slope in the chalk of the immediate neighbourhood being westward, the springs are therefore merely the natural outflow of the water-charged chalk, the water finding its way out at the lowest available places, the slowness of percolation through the rock making the springs constant, though of course varying in amount, instead of their being very great at one time (after heavy rain) and dry at another, as would be the case if the water flowed through quickly."

All this is satisfactory, and the water thus obtained is by no means bad in quality. But some of the springs break out amidst "foul surroundings." For instance, one set at the north rise "directly from beneath the churchyard." This is bad enough; yet in another part, we are told, the most important set of springs "rise upon and around the slope whereon stands the farmstead known as Well Hall." In itself this is a very innocent statement, but when read in the light of Mr. Whitaker's report of five years ago, its innocency entirely disappears. He then said:—"The set of springs at Well Hall seems to be looked on as the fit receptacle for all the filth of the farmyard. One building is directly over a spring, the water of which may be seen oozing out from under the outer wall. At the time of my late visit, a liberal allowance of muck, of which I did not care to make a minute examination, had been thrown down about as near as possible to others of the

many springs there." Let it be remembered this report was given to the Town Council, through its Water Committee, in 1892.

But it does not stand alone. Dr. Bruce Low, the Medical Officer of Health, also solemnly warned his Authority of the terrible conditions under which it was deriving the town's water. In a special report then made he plainly stated that "The feeders of the river receive more or less directly the slop water of Grimstone village, while soakage from privy pits and refuse heaps, as also drainage from farmyards and horse-ponds sooner or later find their way into these tributaries. Two of the springs rise directly from beneath Grimstone churchyard. In addition to the above sources of impurity, the slop waters from the hamlets of Roydon, Bawsey, and Pot Row similarly find their way ultimately into the stream. At Grimstone, and again at Roydon, I saw the overflow pipe of a cesspool, receiving contents of water-closets, discharging into a water-course which flows into the Gaywood River. Similarly, the drains from a slaughter-house, a public-house urinal, and the washings of a laundry empty into water-courses which discharge directly into the stream."

In the face of such warnings as these, it would naturally be thought that some stringent measures would be adopted to effect an alteration. At any rate, this was the idea entertained by Dr. Mivart, and great was his surprise and disgust on paying a visit to the same spot to find exactly the same foul surroundings as those existing in 1892. "The same," but with some additions, "as if these sources of pollution were insufficient." He says, "I found on the date of my visit an immense heap of refuse and farm manure close to the edge of the stream. The inhabitants of two cottages, situated just below this point, obtain water by 'dipping' from the stream, and the enormous quantity of mussel shells thrown upon the very edge of the stream immediately adjacent to this 'dipping' place is significant of the indifference of the population of the district to the purity of their water supply." Whatever possessed the Town Council (especially with the knowledge of past epidemics and disasters) to allow such foulness in a place within its jurisdiction passes our comprehension.

But the story of pollution is not yet complete. Dr. Mivart continued his investigations, and in the following paragraphs he claims to illustrate the dangers to which river water is exposed:—

"Among the sources of serious contamination of the river is a brook falling into it, about two miles from the intake of the public water supply. This brook receives from a ditch the drainage from the farmstead of Waveland. The privy arrangements at the farm are very defective, and the overflow from the privy pit appears to mingle with the drainage from the farmyard and slop-drain. The farmhouse is in the occupation of two families. I was informed that in one of them there had been repeated attacks of diarrhœa during the past summer. Great complaint was made here of stench from the house drain; and, as a matter of fact, at the time of my visit this house drain was being cleared out, whereby the flow of foul liquids into the brook, and thus to the Gaywood River, was being rendered more direct.

"Coming now to Gaywood Village, a mile or so above the intake of the town water supply, the river flows by gardens which abut upon the river. Here in the course of my inspection I discovered several privies placed actually upon the brink of the stream. It is true that in several instances these privy structures were provided with pails said to be emptied upon the gardens from time to time; but there can be no doubt that even their presence in such situation conduces to risk of fæcal matters being washed out into the stream at seasons of heavy rain.

"Adjacent to the village of Gaywood are certain ditches which are only prevented from communicating directly with the river by a thin barrier of clay puddle. These ditches receive drainage from refuse heaps, back yards, a small farmyard, and also the liquid soakage from privies, and in one case the drainage from a patch of kitchen garden upon which previous to the heavy rainfall of September 29th the contents of a large cesspool had been emptied. Though these ditches are in ordinary circumstances prevented by the thin barrier of puddle from communicating with the river, there cannot be the slightest doubt that on the occasion of heavy rainfall they become bank full, and overflowing their dry puddle barriers pour their accumulated foulness into the river.

"At the intake of the waterworks the river water flows through earthenware pipes directly to the settling pond or reservoir known as the Long Pond. Between the river and the pond these pipes are at a varying depth beneath allotment gardens, which are largely the property of the Corporation. Having ascertained that these conduit pipes had not been examined for an unknown period of time, variously estimated at from 10 to 20 years, I had the ground opened over them close to the intake. The pipes were reached at a depth of a little over 3ft., and were found to be leaking so freely at the joints that a pump had to be employed in order to get rid of the escaping water and enable the work to be continued. The pipes are not bedded in concrete but lie in clay, covered by thick heavily manured garden mould. A few feet from this spot the tenant of a garden was in the habit, as he informed me, of emptying every week the contents of a privy pail.

"In the Long Pond the water has ample facilities for further pollution from the washing into it of surface refuse and the soakage to it of liquid from the heavily manured allotment gardens which come down almost to its brink. From a refuse heap close to the pond I observed the clearly marked course of a stream which in time of rainfall had flowed into the pond. As there is a public 'right of way' along one side of this pond which gives access to the allotment gardens, it is impossible to exclude children from the locality. And I was informed that in consequence of the habit they had of paddling with their feet in the water a watchman had at certain times to be posted at this spot."

The result of the examination here recorded confirmed the opinion expressed by the local Medical Officer, that the water had "multifarious opportunities for becoming polluted by human excrement, not to speak of other impurities directly discharged into it, or washed into it, or washed into the stream by heavy rains or melting snow.".

He further points out that notwithstanding chemical examinations of the water by the most eminent analysts, one of whom reported on it as "subject to contamination with animal refuse, nd

another, after analysing eight separate samples, condemned each as "unfit for drinking purposes" —still no action was taken. Yet another warning was given. The medical men of the town wrote to the public Press on the danger existing in their midst. In this letter they stated :—

"Brought as we are into daily contact with sickness and suffering, we keenly feel how lamentable is the amount of preventable disease which exists amongst the inhabitants of the town. Probably no single cause operates more potently in producing this than our impure water supply. Whilst freely admitting that the improvement of our water supply may entail an addition to the rates, we cannot think, even from a pecuniary point of view, this is for one moment to be compared to the advantages we should derive from an abundant supply of pure and wholesome water. To take only one water-spread disease, namely typhoid fever, it is a noteworthy fact that the last epidemic, which unfortunately still lingers amongst us, cost our Board of Guardians £149 16s. 8d., and has left us widows and orphans whose permanent support amounts to £43 15s. 4d. annually. The victims were, however, by no means confined to the recipients of parochial relief. Altogether 131 cases occurred, of whom 21 lost their lives, besides which there were notified 107 cases of continued diarrhœa, considered to have been abortive typhoid. Each case of typhoid fever incapacitates the patient from work for a period varying from six weeks to three months. Such a prolonged illness entails heavy expenses for nursing, extra nourishment, medical attendance and the like, as many families know only too well. We have none of us the slightest doubt that the above epidemic arose from our polluted water supply, and from it alone."

Nevertheless, incredible as it may appear, a large and influential section of the inhabitants of Lynn maintain, or at any rate have maintained until now, that this water, manifestly polluted though it be, is of excellent quality. One individual went so far as to exhibit in his window during the height of the epidemic a vessel of water drawn from the town mains, with a placard attached stating that no better water can be obtained.

Reviewing these facts, Dr. Mivart expresses his opinion that the heavy rainfall of August 9th may have been the cause of the increase of fever noticed early in September, the cases though widely scattered over the town in a fashion consistent with water causation of the disease, being too few in absolute amount at that time to definitely convict the water service of having brought it about.

Not so, however, as regards the exceptional rainfall of the 29th of September. This was followed, says Dr. Mivart, "at an interval of three weeks, by an outburst of the fever on a very large scale indeed. On the 20th and 21st of October the notified cases of enteric fever in Lynn and Gaywood suddenly amounted to twelve. Next day they were twenty-six, and in the four succeeding days to the 26th of October no less than seventy-five additional attacks were notified. And the fever cases of this outburst, be it noted, were distributed from end to end of Lynn and Gaywood, in circumstances which, as I have already stated, left no escape from a conclusion that the outburst had been caused by the water supply. There can be no doubt at all, then, that the epidemic, as such, was due to infection of enteric fever gaining access to the waterworks as a result of the rainstorm of the 29th of September. Why wholesale befoulment of the Lynn public water service effected on one occasion comparatively little mischief, and on the next proved altogether disastrous in the above fashion, is a question which cannot at the present stage of our knowledge be definitely answered. Possibly the storm of 29th September, in that it was as a heavy downpour more widespread than that of the 9th of August, may have (by the floods which it caused) tapped, so to speak, sources of dangerous pollution of the Gaywood river which were not reached and therefore not flushed out into the stream by the even heavier but more localised August rainfall. This, however, is mere surmise. Moreover, we are by way of learning that outside the animal body the microbe of enteric fever is subject to conditions which, within a short space of time, may check altogether its multiplication and annul its virulence, or may greatly enhance its activities in one or both these directions."

The measures taken to stamp out the fever are described by the Inspector, and he concludes by stating that the best was perhaps done in the circumstances to mitigate disaster that should never have occurred. For it cannot be too strongly insisted on that, so long as the supply of drinking water for the borough is derived from the Gaywood River, so long will the borough be at the mercy of water-borne disease. Ever since 1876 the more thoughtful section of the inhabitants have been engaged in a struggle, the bitterness of which only those resident on the spot can realise, to obtain for themselves and their families a wholesome supply of drinking water. In 1875, Mr. Hawksley, being consulted by the Town Council, recommended that the water should be brought in pipes from one of the springs, direct to the town. Since then, until recently, in vain have Medical Officers of Health, and engineers, and surveyors protested, and experts like Mr. Whitaker, F.R.S., and Mr. Mansergh, C.E., reported and advised. The party with whom no argument but the one as to the cost had any weight were too strong. It might certainly be thought that after the severe outbreak in 1892, which was traced in the clearest manner by Dr. Bruce Low to the infection of the public water supply, all opposition to a new source of supply would cease. But such was not the case. In the end, however, a Provisional Order of the Local Government Board enabled the Town Council to carry out a scheme which might otherwise have been frustrated by the opposing section of the inhabitants. The works in connection with the new scheme for bringing water from deep wells in the chalk near Grimstone are being actively pushed forward, but Dr. Mivart was informed that it would be six or eight months before they were completed.

This is the story of how the fever came to Lynn. We commend it to the consideration of those false economists who oppose every public improvement because of the expense. By refusing to accept the advice of its own officers, the inhabitants of Lynn may perhaps have saved a few pence in the pound on their rates, but they have inflicted great suffering on many families and shortened many lives by their misguided parsimony.

SEWAGE PURIFICATION.

MR. H. GILBERT WHYATT, A.M.I.C.E., Deputy Borough Surveyor for Salford, read a paper entitled "The present position of the sewage purification problem," at a meeting of the Sanitary Inspectors' Association (Lancashire and Cheshire Branch) held at the Royal Technical Institute, Salford, on Saturday afternoon, the 12th inst. Mr. J. T. Shawcross presided, and there was a large attendance.

At the outset of his paper Mr. Whyatt remarked that it would be possible to describe in two words the present position of the problem; he proposed, however, to take a comprehensive view of the situation. The first inquiry by the Local Government Board was undertaken over forty years ago, a second was commenced in 1865, and a third in 1868. The third inquiry was the most important, as it was directed to the rivers of typical manufacturing districts in England and Scotland. In their third report the Commissioners said they considered that the right way to dispose of town sewage was to apply it continuously to the land, as it was only by such application that the pollution of rivers could be avoided. Referring in detail to the first report of the 1868 Commission, which dealt specially with the Mersey and Ribble basins, Mr. Whyatt spoke of the importance then attached to the manurial value of sewage sludge. Eventually this idea of manurial value was dropped, and experimenters would have been content with a chemical treatment which would meet the remaining difficulties, but their efforts were futile, and now only "patentees" had any hope of success. The "international" and "electrical" systems were brought forward, and the former had been successfully adopted in many places. The "electrical" was very successful also, but its expense was great. Mr. Whyatt dealt at considerable length with the process of treating sewage by biological agency, which, he said, dated no further back than 1882 or 1884, and about which the report of Mr. W. J. Dibdin (late chemist to the London County Council) and Drs. Sorby and Dupré clearly established the position that the foul matters in sewage were ultimately destroyed by the action of living organisms—the process being biological and not chemical—and it was when these organisms were not allowed full scope to exercise their beneficent life action that putrefaction resulted. Scott Moncrieff, Lowcock, and others had conducted experiments on these lines. In Salford experiments had been going on for about ten years, and much time had been spent on various patented processes, chiefly chemical. About five years ago the Committee turned their attention to artificial filters. The first set of six filters were arranged at three heights, with a ventilation floor between each 2oin. of filtering material. Two filters were composed of gravel and sand, two of coke breeze, and two of cinders, and very good results were at once obtained from them all. Cinders proved the best filtering medium. The experiment was continued for fifteen months at an average rate of 500 gallons per square yard per day, with very successful results. It was then wished to prove the advantage of a preliminary "roughing" filter and varying degrees of aëration; and this experiment was still going on. The filters were tried at varying rates of flow, and so long as a filter did not choke up the effluent was uniformly good. If the filter choked up it was found that by leaving it idle for a week or two it would recover itself and again take the sewage perfectly. In 1895 two filters 8ft. deep were made in order to ascertain whether a deeper mass of filtering material would deal with a larger quantity of effluent, and it was found that while a 5ft. filter would deal with 500 gallons per yard daily, an 8ft. one would deal with 800 gallons. In 1896 the filters were run practically continuously for twelve months at the rate of 1000 gallons per square yard per day, then for a short time at 500 gallons, and now at 700 gallons, the only rest being for a short time daily whilst the small pump supplying them was cleaned. Contrary to expectations, they stood that severe test. In place of the sprinkling troughs spray jets were now used. The surface of the filter was perfectly open and water was not allowed to collect anywhere. There had been no appreciable growth of the brown sewage fungus since 1895, and the bacterial filters had been protected by a "roughing" filter of fine gravel. Some twenty-five precipitation experiments had been tried, and the effluent of all passed through the bacterial filters with good results. The Corporation had resolved to spend £80,000 in altering the works and laying down bacterial filters, but the Local Government Board had refused its sanction unless the Corporation included a sum to cover the purchase of land over which the filter effluent might be turned and further purified. Mr. Whyatt considered the time had come when the Local Government Board should be roused from its state of "agnostical immobility" and take upon itself to examine whether there was not the efficiency in bacterial filters that was claimed for them. Mr. Whyatt was accorded a vote of thanks at the conclusion of the proceedings.

WATER ANALYSIS.

A CASE which showed a remarkable divergence of opinion among experts as to the purity of water came before the Maidstone Police Court, and excited great public interest, following so closely on the Local Government Board inquiry into the cause of the typhoid outbreak in the town. A lady named Prosser was summoned by the Urban District Council for neglecting to close a well, the water of which was declared by Dr. Adams, the Medical Officer and County Analyst, to be polluted and quite unfit for dietetic purposes without previous boiling. On the other hand, Dr. Gregory, a Fellow of the Institute of Chemists, who had also analysed a sample of the water, certified it to be of great organic purity, and perfectly safe for drinking and domestic purposes.

Professor Wanklyn, the inventor of the ammonia process in analysis, which is used by almost every analyst in the country, including Dr. Adams, corroborated Dr. Gregory, and stated that on Dr. Adams's own figures he had come to the conclusion that the water was pure and unpolluted, and quite safe to drink. The analysis in this case disclosed the presence of very little albuminoid ammonia, and that fact alone proved to him that the water was a good one.

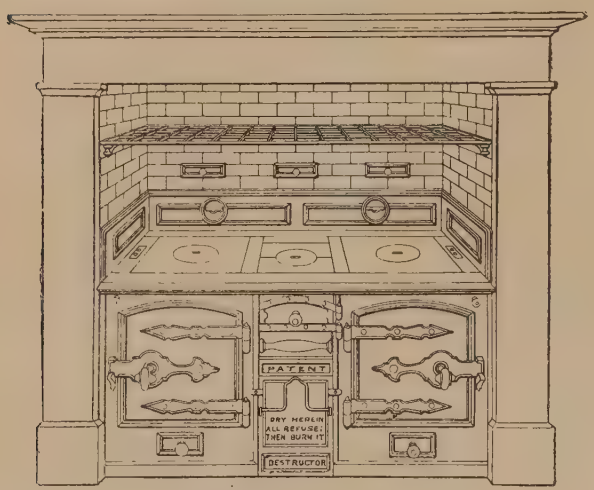
In the end the Bench adjourned the case in order that a sample of the water might be analysed by the authorities at Somerset House.

A DOMESTIC REFUSE DESTRUCTOR.

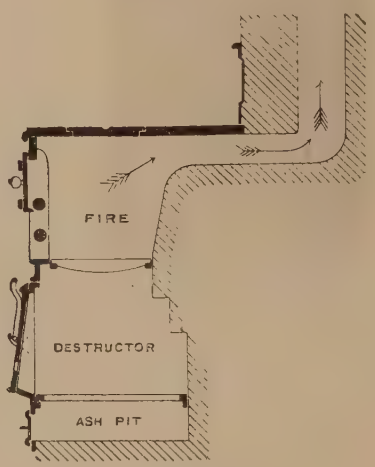
At a time when refuse disposal is "in the air," it is hardly surprising to find an adoption of the methods which obtain in communities to the needs of the individual householder. The practicability of such an innovation becomes obvious when the possibilities are minutely examined, and it has been the happy notion of Mr. J. B. Petter, of Yeovil (inventor of the well-known "Nautilus" grate), to carry out the idea to its practical issue. Recognising that what can be done on a large scale on behalf of the community at large by the local Sanitary Authority might be equally well done at first hand by the individual, he has designed a domestic refuse destructor which, combined with the ordinary kitchen range, performs the function of destruction on the spot, thus relieving the Sanitary Authority of one of its most onerous duties.

The destructor is a simple apparatus, which, combined with a kitchen range, provides a means of destroying, day by day, all house waste and refuse, such as potato peelings, cabbage leaves, fish bones, &c. &c., thus doing away with the annoyance caused by the accumulation of such unsavoury rubbish in the dust-bin. The ashpit of an ordinary range is enclosed, making a chamber into which the refuse is placed, to be dried by the heat of the fire; all greasy or fatty matter is effectually absorbed by the ash falling through the fire-bars, and when everything is reduced to a combustible condition it is shovelled into the fire. A constant in-draught is ensured by means of holes in the door of the destructor, whereby the fumes are carried up through the fire, and thence into the chimney. This, with the close and accurate fitting of the door, prevents the escape of any vapour or smell into the kitchen. Thus use is made of the ordinary kitchen fire in the actual work of destroying the refuse, and the slow combustion character given to it by the closing of the ashpit, while rendering it hotter and more effective, at the same time lessens the consumption of fuel.

A striking testimony of the value of Mr. Petter's patent has been afforded by Dr. Garland, Medical Officer of Health, Yeovil, who, having adapted the destructor to his own kitchen range, is, it must be admitted, fully qualified to give an opinion concerning it. Dr. Garland considers the invention, from a sanitary point of view, the greatest boon ever conferred on householders, not only on account of its effective work as a destroyer of noxious exhalations arising from culinary waste, but also on account of the economy which is evident in the consumption of fuel, which he has proved by experience to be considerable. Dr. Garland, in short, endorses its claim to practical utility in every respect, and predicts that there is a great future in store for it. While the general adoption of such an invention can hardly hope to relieve Local Authorities of their responsibilities altogether, or to render the use of refuse destructors by such Local Authorities unnecessary, there is not the slightest doubt but what its general adoption would minimise their work considerably, and it is perhaps not too much to look forward to a time when "every man his own dust destructor" will be a *sine quâ non* of household sanitation.



A Modern Kitchen Range fitted with Patent Domestic Refuse Destructor.



Section through Fire.

London, W.C.—The Board of Works for the Holborn district is about to appoint an additional Sanitary Inspector at a salary of £120.

The Relative Cost of Works of Sewage Disposal. — A letter on this important subject by Mr. C. Chambers Smith, C.E., Sutton, Surrey, in reply to the letter by Messrs. Cameron, Commin, and Martin, which appeared in our issue of last week, is unavoidably held over.

TO OUR READERS.

The Editor solicits the co-operation of readers in making The Sanitary Record *more attractive by means of pen-and-ink sketches, photographs, and diagrams. There are many phases of sanitary work which lend themselves admirably to illustration. By this means not only individual articles, but the journal as a whole will be heightened.*

Supplement to THE SANITARY RECORD.
Feb. 25, 1898.

SECTIONS OF

SAMPLE BOTTLES OF TRADE EFFLUENTS

BEFORE TREATMENT.

59.

79.

81.

83.

91.

95.

MECHANICAL FILTRATION.

By FREDERICK BRISTOWE.

IT may perhaps astonish some people to learn that mechanical filtration is still grievously misunderstood, even by those who are supposed to be best qualified to express an opinion on such a subject. For some years past mechanical filtration has received a great deal of attention in certain quarters, and the results that can be achieved to-day are so convincing that any one who will consent to investigate the matter with a previously unbiassed opinion, cannot fail to be convinced of its utility, economy, and efficiency.

There are, of course, some people with whom it is useless to argue, as they have made up their minds that mechanical filtration is an impossibility. Such people, even if you succeed in showing them a plant of mechanical filters actually in operation—a plant which, for the sake of argument, may be treating a dye-works effluent, and producing therefrom a clear, bright effluent—will ask you where the towns main comes in, or some such equally ridiculous question.

MR. FREDERICK BRISTOWE.

In quoting this instance it must, of course, be understood that a mechanical filter to be of any practical use must be in all respects self-contained, and constructed on scientific principles. For instance, a manufacturer when going into the question of filtration, will tell you that he requires a certain quantity of water per day. This water must attain to a certain standard of purity, which standard must be maintained continuously. He will also tell you, in all probability, that he has very little room to spare, and therefore cannot provide any large amount of storage. A mechanical filter to suit these requirements must therefore be arranged in such a manner as to supply the required quantity of water continuously, and at the same time be capable of maintaining the standard of purity.

Up to this point filtration is, comparatively speaking, an easy matter. The water being filtered naturally leaves a large amount of sediment in the filter, which, without mechanical means, it is either impossible or too costly to get rid of without losing the filtering material.

In a properly constructed mechanical filter the process of washing and cleansing the filtering medium is a very simple operation, as the filter can be cleared in the course of a few minutes, without losing any part of the filtering medium, or stopping the supply of clean water to the works. A mechanical filter can be so arranged as to work under any pressure required, and by this means will save any labour or expense in extra pumping, as the water can be forced through filters placed on the main supplying the works in question.

In respect to the question of economy there is a great deal to be said in favour of mechanical filtration. To begin with, there is the enormous economy gained in space occupied, which in all works is of the greatest importance. Then, again, a properly constructed mechanical filter is to all intents and purposes automatic, thereby effecting a considerable saving in labour, as opposed to the open filter bed process. Another important point is the rapidity with which the process of filtration can be effected, thus obviating the nuisance of which so many complaints are heard in manufacturing districts of the fouling of their clean water reservoirs by the dirt in the atmosphere.

Mechanical filtration is still most wrongly judged by many scientific experts. Either they refuse entirely to investigate the question at all, or they imagine that mechanical filtration is setting itself up in opposition to all other processes of purification by filtration. This, idea is, of course, to anyone who knows anything of the subject an absolute misconception, not to say a deliberate false statement, for while it is evident that a very large percentage of purification can be effected by means of proper mechanical filtration, even the most enthusiastic promoter of mechanical filtration must admit that as regards certain impurities in solution, it is impossible to guarantee absolute purification by this process alone.

The great claims of mechanical filtration are

that it can work very quickly and efficiently, that it affords the cheapest, the simplest, and the readiest means of clarification, and that rather than being in opposition to many of the leading principles of the day, it would save much argument and trouble, to say nothing of expense, if it received more general attention, and its results were more universally admitted.

THE PLAGUE IN INDIA.

EARL SPENCER presided last week at a lecture on the plague in India, delivered at the Imperial Institute by Mr. H. M. Birdwood, C.S.I., M.A., LL.D. There was a large audience, among those present being Countess Spencer, the Earl of Northbrook, Sir Stewart Bayley, Sir Owen Tudor Burne, Sir Frederick Abel, Sir John Jardine, Sir Richard Thorne Thorne (Principal Medical Officer of the Local Government Board), Sir Juland Danvers, Sir George Birdwood, Sir M. Bhownaggree, M.P., Lady Honora Cadogan, Lady Wood, Lady Pearson, Sir William Roberts, Sir Charles Lawson, Sir Dyce Duckworth, and Surgeon-General Webb.

Among the letters of apology for absence read by the Secretary was one from Mr. John Holland, senior collector at Bombay, in which he paid a high tribute to the devotion shown by Mrs. Birdwood in visiting the plague-striken natives.

In introducing the lecturer, Lord SPENCER disclaimed any special knowledge of Indian affairs. He was afraid that in the past want of interest or want of information had been too often displayed by our people in Indian matters, but he was glad to see so large a meeting that day. We had the greatest sympathy with the people of India in their distress, and the highest admiration for the patriotic work done by all those who were trying to get rid of the plague.

Mr. BIRDWOOD commenced a historical comparison with the great plagues of the past, the sicknesses and black deaths which swept over Europe in the middle ages, which devastated London in 1665, and did not finally disappear until in the present century. As late as 1878 there was a recrudescence of the mediæval plague on the banks of the Volga; and perhaps we have not even now altogether banished it to the East whence it came. It is rather a curious fact in connection with the spreading of the plague that it never invaded Africa with success, or got beyond the Northern coasts—a fact which, perhaps, the bacteriologists of the future will be able to explain. Various causes have been assigned as the origin of the plague—that of the drowned corpses of the Chinese floods being the most popular—but the immediate cause of infection is a tiny bacillus.

The lecturer threw a photograph of a cultivation of the bacillus upon the screen. It is a tiny body of what is sometimes called the lead-pencil order of micro-cocci—cylindrical in shape and, perhaps, two and a-half times as long as it is broad. This little unicellular being is only the one ten-thousadth part of an inch long, by the one twenty-five thousandth part of an inch broad, and it is hardly to be wondered at that the bacteriologists know little about his protoplasmic constitution or the kind of treatment which is fatal to him as yet. They have, however, classed his unicellular body, which, from Mr. Birdwood's description of him, appeared to belong to the "mycetozoa," as a vegetable, and it seems pretty certain that he is not stimulated by cold water. Nearly all the great plagues of the past have been favoured by hot and dry years; the year of the Great Plague of London was unusually torrid; and 1896 was the hottest summer that Bombay or India had experienced for fifty-one years. The worst months were the February and the March of 1897, which were very hot and dry, with the usual dry north-east wind blowing over India. The plague began to abate as soon as the wet south-west monsoon swept round in the middle of April. The medical authorities, at any rate, were convinced that water was a terror to the microbe; and every house that was affected was treated as if it had been a burning building. The municipal fire engines were turned upon it, and it was deluged inside and out. Some authorities professed to regard this as an expensive and useless remedy; but another remedy suggested by Lord Lister, of sluicing all drains with lime water, was of undenied benefit. In one other respect the plague respected the old tradition concerning it. It was, as Piers Plowman witnessed, "a poor man's plague." The greatest sufferers were the Hindoo outcasts; next to them the Hindoos. The Mohammedans suffered little, the Parsees rather more; but the Europeans, whose lives were led amid the best and most sanitary conditions, suffered least of all. There are two other points to be noticed with regard to the plague. Inoculation proved an extremely serviceable remedy, and whereas in the Great Plague of London 68,000 people died out of a population of 490,000, in Bombay only 20,000 died out of 900,000.

One of the most interesting portions of the lecture was the reference to the part played by rats in spreading the disease. It is thought that in a newly-attacked district the imported germ is not strong enough to infest men, but seizes on the rats. The death of the rodents is not the first phenomenon, however. It is preceded by a migration, and in Thana the "Rats' Progress" has been traced from south to north, through towns and villages which were not infected until they brought the plague.

A vote of thanks to Earl Spencer and Mr. Birdwood concluded the proceedings.

HEALTHY TOWNS AND VILLAGES.

SOME POINTS FOR PUBLIC BODIES.

A LECTURE on the subject of "Healthy Towns and Villages," one of a series which Miss Alice Ravenhill, of the National Health Society, is delivering in Leeds, was recently given in the Lecture Hall of the Yorkshire Ladies' Council of Education in Albion-street. Miss Ravenhill, in the course of a thoroughly practical discourse, touched on the question of the Rivers Pollution Act, pointing out that while various effluents were prohibited from entering a stream, there were at the same time so many saving clauses that Authorities were often powerless. It was, however, possible for a number of towns to join together to get powers enabling them to deal with the question, and Leeds, Bradford, and other places had combined to form

the West Riding Rivers Board, which had done something to institute proceedings, and had not been discouraged, even by failure to obtain convictions. But, speaking generally, the provisions of the law on the subject were so complicated that people had let the Act alone. They wanted a large amendment of the law, which would give full power to Local Authorities. In Leeds they had a bye-law which made it necessary for the Medical Officer's certificate to be obtained before any trade effluent could be passed into the river, but that did not apply to neighbouring towns. The Act at present was cumbersome, unwieldy, and very little good to the community. In the matter of open spaces Leeds compared very favourably with Manchester. In the latter city the average of open spaces to population was half an acre per 1000; while Leeds in 1895 had two acres, and since then had added other recreation grounds. The Allotments Act had proved complicated and difficult, and provided for no security of tenure, while the land was let at double the rate at which it was held by a tenant-farmer. The municipalisation of tramways was always desirable, because the Corporation could assist in that way in taking the people to less congested parts. Leeds has adopted the Baths and Wash-houses Act, but as yet there had not been great haste in erecting baths. It was very desirable that some provision should be made for mothers being able to give their children a bath at least once a week, because in the poor districts there was not much accommodation for such a thing in the cottages. What the lecturer would suggest was what had been already adopted in some of the large towns in Yorkshire, namely, that mothers should be allowed to wash their children at a charge of a halfpenny each, a plan which would assist materially in the promotion of public health. Miss Ravenhill then alluded to the importance of vaccination and the desirability of some method of keeping the general body of the people fully cognisant of the evils which early in the century had resulted from the lack of inoculation, because the comparative immunity from the disease which existed now-a-days made them forget what a terrible malady small-pox was. The importance of the Notification of Infectious Diseases Act was also emphasised, the lecturer referring at the close to the new isolation hospital at Manston, where the accommodation was as yet inadequate, though the fever-rate of Leeds was high. The matter was one for the ratepayers themselves, who should see that there was no delay.

LONDON AND WORKMEN'S DWELLINGS.—At Tuesday's meeting of the London County Council (the last prior to the election) it was stated by Mr. Alfred Smith, chairman of the Housing Committee, that up to March 31st, 1897, the Council had in occupation dwellings erected and purchased at a cost, including all expenses of supervision, of £267,254 5s. 2d. Tdere were at that date in course of erection further buildings estimated to cost £60,209. Those, with one exception, had now been completed, and were occupied. The total expenditure on dwellings erected and in course of erection (including the cost of the land) had only been £387,458, for which sum the Council had provided accommodation for 6606 persons, and in addition had provided 17 shops, 100 workshops, 12 stables, and 20 sheds.

Inc. Society of Medical Officers of Health

METROPOLITAN BRANCH.

AN ordinary meeting of the members of the Metropolitan Branch of the Incorporated Society of Medical Officers of Health was held on Friday afternoon, the 18th inst., at 197, High Holborn, the offices of the St. Giles' District Board of Works. Dr. Edmund Gywnn, Hampstead, the president of the branch, occupied the chair, and those present included Drs. Louis C. Parkes, Sidney Davies, Reginald Dudfield, M.A., M.B.; J. F. J. Sykes, M.D., D.Sc.; J. C. Jackson, D.P.H.; F. J. Allan, M.D.; and O. Field, M.D., Wandsworth, the hon. secretary.

Dr. LOUIS C. PARKES, M.D., D.P.H., the Medical Officer of Health for Chelsea, opened a discussion on "Sewer Ventilation." He said that until the researches of Parry, Laws, and Andrews, it was generally held that sewer and drain air was liable to contain the poisons of enteric fever, cholera, and other diseases—a view which led to the free ventilation of sewers, on the ground that the more sewer gases were diluted with fresh air the less would be the danger. Hence the provision of surface gratings and the modern practice of trapping, disconnecting, and separate ventilation of house drains. From the researches of Haldane, Carnelly, Parry Laws, Andrews, and others, it was found that micro-organisms in sewer air appeared to be exclusively derived from the outside atmosphere, and not from the sewage. Microbes, which abound in sewage in inconceivable numbers, were not found in sewer air. If, then, sewer air did not contain infectious microbes as supposed, why perpetual disconnection and separate ventilation of house drains? Why have traps and gullies at all? Why take all these elaborate precautions if there is nothing in any way dangerous to health in breathing sewer air? But were the researches and experiments hitherto made final? Did it necessarily follow that the absence from sewer air of all microbes contained in the sewage imply the harmlessness of such air? Now, the methods for the detection in liquids of the bacillus typhosus and other organisms had undergone great improvement since Parry Laws made his experiments, and they were still being perfected. Then as regards the harmlessness of sewer air, there were histories of numerous outbreaks of enteric fever, in which the most competent observers had expressed the opinion that the evidence irresistibly pointed to the cause being sewer and drain emanations. There was a mass of evidence in the hands of the medical profession that drain and sewer emanations are the cause of much illness. As regards human specific diseases, were they yet in a position to assert that it is the presence of the specific microbe that always determines the onset of the disease? At present they were only on the threshold of understanding the part microbes play in nature, and the trend of modern investigation gave more and more importance to the predisposing causes, and detract from the view originally held that the specific microbe was the be-all and end-all of diseases. Was not this particularly true of the part played in disease causation by dirt, overcrowding, dampness, drain and sewer emanations? A population living under ideally perfect sanitary conditions would have

little to fear from bacillary diseases. As Medical Officers of Health, they were entitled to say that the harmlessness of drain and sewer air had not yet been demonstrated; on the contrary, there had been much to show that the breathing of such air may be the determining cause of various illnesses. Under these circumstances, he thought they ought to insist on sewer gases being dispersed into the atmosphere in such a way as not to become a nuisance and injury. This involved the condemnation of roadway surface ventilation, but as openings must exist to prevent pressure into the houses, and for other reasons, the question was what openings should they have. He thought the desired results could be obtained by 6in. shafts conducted up the sides of houses, or by 6in. iron ventilating standards 20ft. to 30ft. in height, placed in the most open situations away from houses, or where necessary in the streets, placed on refuges like the electric light standards in the middle of the roadway. This method had been adopted in several provincial towns recently sewered, and the gases escaped well above the level of foot and carriage public. In narrow streets the danger of the gases escaping into the houses would be greater, but not greater than at present exists with surface gratings. He did not see what more could be done. Special ventilating fans, furnace draughts, and similar means had been shown over and over again to be impracticable. Sewer air deodorisation by charcoal and chemicals was of no avail, and sewer air cremation, he believed, had been abandoned. Of course, they would advocate the replacing of old sewers by sewers of modern construction, for nuisances arising from defective sewers could not be got rid of in any other way. To his mind, the interception of house drains is now inevitable, but twenty or thirty years ago a different system was possible, and would probably have answered better, but was rejected in deference to the then prevailing views of the infectivity of sewer gases.

The PRESIDENT said the question had been agitated for the last twenty years, but it did not get much further. He had always regarded sewer air as harmful. At Hampstead the sewers had been ventilated by means of pipes up the trees, but the cost was almost prohibitive.

Dr. F. J. ALLAN, Strand, referred to the attitude surveyors had taken on this question, which it was proposed should be discussed at a conference of Medical Officers and Surveyors. Sewers could be divided into two classes, local and main, and they required different treatment. If the local sewers were properly laid they would not want very much ventilation.

Dr. SIDNEY DAVIES, Plumstead, thought that what was required was more vent, not ventilation.

Dr. R. DUDFIELD, Paddington, remarked that the existence of what they called, for want of a better name, "drain throats," was a clear indication that sewer gas is not innocuous.

Dr. J. F. J. SYKES, St. Pancras, said that Medical Officers were agreed that sewer gas in the house is dangerous. The negative results of the researches up to the present time could hardly be accepted as binding. Anything which would drive sewer gas into the houses was not the right course to pursue; let it go into the streets, at any rate, where it was less dangerous. The reason why the County Council sewers were more nuisance than the local sewers was because they are only periodically wetted, in the meantime being dry and emitting horrible smells.

Dr. JACKSON, Fulham, having spoken,

Dr. PARKES replied to some of the points raised. He said that the most complaints came about the Council's sewers, and he thought that they ought to insist that the boundaries of London should not be further extended, for already stale and putrid sewage from other districts passed through large populations. Then some of the old flat-bottomed sewers still existed, and these ought to be abolished and proper sewers put in their place; indeed, he believed that in some cases the sewers had no bottoms, but simply carried the sewage along on the clay. He did not think it was possible to abolish the interceptors, because so many houses had been re-drained. The system must now go on, although many now agreed with him that there was not so much necessity for it, as the idea that sewer air contained germs of specific disease had been abandoned. But in respect of predisposing causes sewer gas was more dangerous than ordinary air.

Dr. DUDFIELD called attention to a published statement that the Government were about to appoint a Commission on the bacterial treatment of sewage, and moved a vote of thanks to Dr. Parkes for his paper, which was carried *nem. con*, and the proceedings terminated.

Sanitary Inspectors' Associations.

LONDON.

THE fifteenth annual dinner of the Sanitary Inspectors' Association was held with much success at the Holborn Restaurant on Saturday evening, the 19th inst., the President, Sir John Hutton, J.P., L.C.C., occupying the chair; being supported by Sir Walter Foster, M.P., Sir J. Crichton Browne, F.R.S., the Archdeacon of London, Mr. F. O. Crump, Q.C., Dr. H. Mansfield Robinson, LL.D, Professor Attfield, Mr. E. Lewis Thomas, Mr. J. Savage, Mr. E. Haward, Mr. Aubrey Richardson, Mr. J. T. Brown, Mr. J. T. Moss-Flower, Mr. C. T. Kingzett, F.I.C., Mr. P. Gates, Dr. Milsom Rhodes, Mr. A. Shand, J.P., Mr. C. W. Raymond (the hon. treasurer), Mr. T. G. Dee (the chairman of the Council), Mr. W. H. Grigg, Mr. W. H. Watson, Mr. D. Travis, Mr. H. Alexander, Mr. W. W. West, Mr. E. Tidman, C.E. (the hon. sec.), and a large number of members, the King's Hall being filled. During the evening a musical programme was carried out by Messrs. C. B. Macdona, G. Hope, J. H. Jenkins, F. E. Poucheron, and Mr. T. Best Folkes, Mr. Grasen Hope being at the piano. Grace was said by Archdeacon Sinclair, and after dinner the loyal and patriotic toasts were duly honoured, the latter being proposed by Sir CRICHTON BROWNE, and responded to by Dr. MANSFIELD ROBINSON.

Mr. AUBREY RICHARDSON gave "The Houses of Parliament," and in replying, Sir WALTER FOSTER, M.P., said the House of Commons had a great deal to do with the public health service, and he was sorry that by the last Local Government Bill Sanitary Inspectors were not all favourably affected. This, he thought, was a good reason why they should keep a vigilant watch on the proceedings of the House of Commons.

In giving the toast of the evening, "Success to the Sanitary Inspectors' Association," the PRESIDENT, who was received with loud cheers, said the year through which they had passed had been somewhat uneventful, but they had been able to keep together in a way which showed the Association was on a firm and substantial foundation. He thought this was due to the fact that they had not sought to limit the operations of the Association to London, large as London is, but had extended their organisation throughout the length and breadth of the land, having now a membership of 700. They hoped that the coming year would see a still further appreciation on the part of Local Authorities for the work of the Sanitary Inspector, because they could not forget the fact that among the four and a-half millions of people in London there were only some 200 Inspectors, who, capable as they were, without a doubt were totally inadequate to grapple with the needs of the city. Then, too, when they considered the fewness of the number of men engaged they were appalled at the poverty of the remuneration those men received. Out of the 200 Inspectors only nine received a salary above £200 a year, and there were 112 Inspectors who received below £150 a year. That was a totally inadequate remuneration for the services rendered, and he could assert that if they desired, as they all did desire, to attract to sanitary labour men of strict integrity and great ability, men with special learning for the discharge of special duties they could not hope to be successful until the remuneration for those gentlemen was on a higher scale. He felt this keenly, because the London County Council was under agreed circumstances obliged to pay a moiety of those salaries, and the Council was now considering as to whether it could not usefully take a stand in this matter by insisting upon Local Authorities increasing the remuneration of Sanitary Inspectors in order that the right class of men could be attracted to this branch of the public service. (Loud cheers.) It was said it took three years to make a soldier, whose highest aim was to take life; was it not a sad thing to think that no training whatever was provided for those whose occupation was not to take but to save life? He hoped to see the day when there would be a college for the education and training of future members of that Association, or, at least, that there might be founded special classes where the elementary principles of the science they followed could be taught. Perhaps the scheme for a Chadwick-Richardson foundation might be a step in that direction. Whatever their discouragements might be — and from the nature of things a Sanitary Inspector was bound to make enemies—he was sure they would go on striving after the public good. They must remember that their highest duty was to see right and justice done. In their hands were placed numberless lives of the poorest and most helpless of people, and the trust was a sacred one, which they should not lightly undertake or ignore. So long as their enemies were the wrong doers then by all means let them boast of having such enemies. He believed their hearts were in their work, and he judged this not only from the excellence of the work done under such diverse circumstances, but he judged it from the intelligent contributions to the literature. They had to deal with much poverty in this splendid, sorrowful, sinful city; they saw many scenes of degradation and of vice; let them regard themselves as those whose mission it is to alleviate pain, to save life, and to make life higher, better, and nobler, then with vigour and interest they would go on their way knowing they had done something towards the common good. (Loud cheers.) The toast was enthusiastically drunk, and the President then made a presentation of an illuminated address and a gold watch to Mr. C. W. Raymond, one of the founders of the Association and its hon. treasurer for fourteen years. He referred to the admirable self-sacrificing work of Mr. Raymond, and said the testimonial was a worthy mark of esteem and regard of his fellow members.

Mr. C. W. RAYMOND having suitably acknowledged the gift, the President made a second presentation, the recipient, Mr. W. W. West, being taken completely by surprise. He said that the members desired to mark their appreciation of the manner in which Mr. West had occupied the chair of the Council, and asked his acceptance of an illuminated address and a handsome writing case as evidence of the feelings entertained for him by the members of the Association. Mr. West having replied, Mr. E. Lewis Thomas proposed the toast of "Local Government," and Mr. A. Shand, chairman of the St. Olave's District Board of Works, responded. "Education" was toasted at the instance of Mr. F. O. Crump, Q.C., and the Ven. Archdeacon of London, in an amusing speech, which was well received, responded. Dr. Rhodes gave "Science and Art," and Professor Attfield acknowledged the toast, which was followed by that of "The President," appropriately submitted by Mr. Percy Gates, and it was drunk with great enthusiasm. Sir John Hutton having replied, the toast of "The Executive" was given by Mr. Crump, and Messrs. T. G. Dee, C. W. Raymond, and E. Tidman replied. Mr. C. T. Kingzett proposed "The Visitors and Guests," and Dr. Mansfield Robinson and Councillor Hudson, of East Ham, acknowledged the compliment, the toast of "The Press" was submitted by Mr. Macmahon, and in the absence of Mr. J. T. Brown, of THE SANITARY RECORD, who had to leave early, was replied to by Mr. Clarence E. Ady, the enjoyable gathering dispersing at a late hour.

MUNICIPAL OFFICERS' ASSOCIATION.—Alderman Sheriff Frank Green, in the absence of the Lord Mayor through indisposition, presided on Tuesday night in the Council Chamber, Guildhall, at the fifth annual meeting of the Municipal Officers' Association—an organisation admitting to membership officers of "any statutory Local Government Authority," which seeks, among other objects, "to secure adequate superannuation for its members," and considers Local Government questions, together with judicial decisions and proposed legislation relating thereto. Since the preceding annual gathering, it was reported, the membership of the Association, now nearly 1000, had trebled, and satisfaction was expressed at the steady increase in the number of members resident, not only in London, but in all parts of the country. The Lord Mayor was elected president, and the vice-presidents chosen included Mr. C. J. Stewart and Sir A. R. Binnie, of the London County Council. A discussion took place on the Superannuation Bills now before Parliament.

Institute of Sanitary Engineers

THE CHEMICAL EXAMINATION OF WATER.

By RICHARD HORTON.

(*Continued from page* 179.)

I will here give the analyses of the samples of water mentioned in the first part of my paper.

Sample of water from well near Tunbridge Wells :—

	Before cleaning.	After cleaning, &c.
Chlorine	2·2 grains per gallon	1·6 grains per gallon.
Free ammonia..	·04 parts per million	·026 parts per million'
Albuminoid ..	·29 ,, ,,	·074 ,, ,,

It will be seen that there could be no hesitation in condemning this water, which was justified by results of the second examination after cleansing.

Analyses of water from a well in North London, supposed to be 18ft. in depth, which was afterwards proved to be 68ft. deep :—

	My own examination.	The Public Analyst's.
Chlorine	·8 grains per gallon	1·4 grains per gallon.
Free ammonia..	·03 parts per million	0·000 parts per million.
Albuminoid ..	·07 ,, ,,	0·071 ,, ,,

The analyst's analysis was made a month after my own, and the ammonia was returned as grains per gallon, but has been calculated on the million by me for the purpose of comparison.

It is as well, perhaps, to make a simple test for poisonous metals, as follows :—Take two white glazed basins, each capable of containing 100 cubic centimetres. Into one basin pour 70 cubic centimetres of distilled water, and the other 70 cubic centimetres of the water to be tested ; dip a clean glass rod into a bottle of ammonia sulphide solution, and stir into the water to be tested with it ; treat the distilled water in a similar manner, using a clean rod. If either lead, iron, or copper is present the yellowish colour imparted by the sulphide will be blackened more or less according to the quantity of metal present. This colour, however slight, may be seen by comparing with the similarly treated distilled water. If a colouration other than the slight yellow colour should occur, it ought to immediately disappear upon adding a few drops of hydrochloric acid, indicating iron ; if it does not disappear lead or copper or both are indicated.

It would not be possible, in a short paper, to give full working directions for either of the processes touched upon, but I trust sufficient may have been included to induce those who think the chemical examination of water is wrapped up in mystery and difficulty to attempt the work experimentally, and I am assured that even should they not make a constant practice of it in their work, the knowledge gained will be invaluable to them in considering the reports of public analysts.

The whole subject is so interesting that at least to some the brief description of water analysis here given will be very inadequate. To those I can confidently recommend Wanklyn's "Water Analysis," which is written so simply that previous knowledge of chemistry is not necessary to understand every operation described, and, if further information is desired, Kenwood's "Public Health Laboratory Work" will, if purchased, not be regretted. The latter book includes an article on the bacteriological examination of water.

The CHAIRMAN asked if the lecturer in taking samples of water was always careful to put them in bottles or receptacles which had been cleansed ?

The LECTURER said that was very important. The glass bottle should first be cleaned out with acid and rinsed out with ordinary tap water. Hydrochloric acid he used—they must rinse it out until they could not taste it. Then they must put the stopper in and take a piece of clean linen rag and tie it over the bottle. When they took a sample of water they should rinse out the bottle several times with the water they had to test. They should fill the bottle two or three times and shake it about, and then fill it with the water to be tested, and put the stopper in. It was most particular that they should tie it down. If they were taking a sample from a well they must not take the contents of the pump, but pump until they had the water from the well. He was very glad the Chairman had asked that question.

Mr. FARLEY said he would like to refer to one particular fact. With regard to the outbreak at Maidstone, he did not know who made the bacteriological examination of the water, but it was said to be quite impossible to find any typhoid germs in the water, so that it seemed to point that an analysis of water was not to be relied upon under all circumstances. As far as he understood, there were two or three samples taken, and in none of them were any germs of typhoid found. That led them to the conclusion that the typhoid germs, so-called, could hardly be said to have been discovered. They knew that there were benificent and malignant germs. It was a question to him whether really the typhoid germ had ever been discovered. It was a very strange thing, but he believed at Worthing the same thing obtained. He had listened with very great interest to Mr. Horton's paper, and, of course, there was no doubt that an engineer should know something about water analysis, but at the same time he should not recommend any engineer to attempt analysis himself. All the operations were so delicate, and, of course, required a great deal of time. As a matter of fact, if an engineer's time was not more valuable than to spend it in the analysis of water he could not have much practice. An analyst had eight or nine samples of water around him which he could analyse at the same time, but if they, as engineers, took a sample of water, although they might know how to do it, they would find the time it would take would certainly trespass to a great extent upon their business. Of course analysis, as he had said, was valuable—very valuable—but at the same time it did not do to depend on it, and in country districts his recommendation, where water was at all suspicious, was to carefully boil it. The objection to boiled water was that it was insipid afterwards, but if they put it through a filter they could make it bright and sparkling again, although he did not recommend filters as such, with the exception that there was one at the present time which could be relied upon with certainty : that was the Pasteur-Chamberland ; and there was also another one as reliable—the Berkefeld. There was no doubt the Pasteur-Chamberland filter took out every germ known to science, but still at the same time if the water was allowed to stand after it had been through the filter the germs got there again and multiplied again. So unless they drank the water as soon as it came through there was still that

danger. He did not know whether he would be right in taking on himself to propose a vote of thanks to Mr. Horton, but he was sure their thanks were due to him for the very interesting paper he had read, and for the time and trouble taken by him on their behalf. It was a very interesting subject, but he was afraid in a paper of that sort it was somewhat difficult to follow it. At the same time it was a very interesting subject, and there was not the slightest doubt that with a small amount of practice a man could get fairly accurate results. He begged to propose a hearty vote of thanks to Mr. Horton.

Mr. WELLS said he had much pleasure in seconding the vote of thanks. He was sure he had listened with great pleasure to the explanation of the analysis which had been given them, and it would be a great benefit to them to read the paper at greater length when they got it in their RECORD, and could follow it better than they were able to do there that night. He was sure it would be an encouragement to all of them to try and follow out the experiment which they had been shown that evening.

Mr. CARTER said he could only re-echo the remarks of the previous speakers. He had listened with great interest, and although they could not all expect to follow it up in their own work, yet they might have some spare time, and he thought the paper which Mr. Horton had given them would be of benefit to themselves and the profession. He should certainly make an attempt himself to do it in a small way. He would like to know the cost of the book Mr. Horton had referred to.

Mr. HORTON said it was 5s. gross.

Mr. FARLEY said there was one thing very important to know in taking a sample of water, and that was that their bottle was clean, and that there should be a glass stopper. Very frequently in his little way he had samples brought in dirty old corked bottles. Water of that kind was of no use. The operation was so delicate that they must have sterilised bottles, and they must also be careful, if they were in a perspiration, that their fingers did not touch the stopper as they put it in. All those things were of great importance if they wanted to get a correct analysis, and he thought everyone who had to do with taking those samples should know those important points.

Mr. HORTON said that last matter was most important. He did not know whether they had missed his most important point. He did not propose to make an absolutely correct analysis of water, but simply to give an indication of the water, so that if they had water loaded with chlorine or ammonia, they might be tolerably certain they had pollution somewhere, and it had to be found out. That was what he tried to impress in his paper. If they discovered a large quantity of inorganic matter, that classed that water as undoubtedly dangerous for drinking purposes. Of course they could suggest boiling and filtering, and that kind of thing, but still he thought until they knew whether the water was pure or impure they would hardly recommend a person to boil the water. Honestly they could not. It would not have been fair to put the person using the well he had mentioned in the North of London to the trouble of boiling the water which turned out to be from a deep well and of better quality than ordinary London water, for the boiling would probably have spoilt the water. They wanted to be able to get an idea of the water in outlying districts, so as to advise or not that a sample should be thoroughly analysed by a competent analyst bacteriologically, although he thought in the present state of bacteriological knowledge it did not so much matter. As far as the Maidstone epidemic was concerned, he had read what Mr. Farley had stated himself, and he was rather amazed to find that the water showed no signs of bacteria, but that might be explained by the fact that the bacteria was not able to live in pure water, and if the water had been purified since the typhoid outbreak bacilli would have vanished. To have got a proper idea the analysis should have been made during the outbreak of fever. To analyse the water afterwards was not quite the same thing.

Mr. FARLEY: But you know they took it while it was going on, and there were several cases afterwards from the same water?

Mr. HORTON said it might not have been the same water, and the people would not take ordinary precautions, and they could not tell that frequent discharges were not observed by the people in the same villages—it was evident from the report in some cases. Still there was no doubt that the chemical analysis did give a very good idea of the quality of the water. As to whether it caused typhoid fever if drunk they could not say.

The CHAIRMAN: Your point is that your experiment would give sufficient indication if there was any serious pollution of the water?

Mr. HORTON: Yes; if there is anything at all.

Mr. FARLEY said if there was chlorides or chlorine there was evidence that there had been pollution, but it would not give the knowledge that it was still going on. A water with plenty of chlorine was a nice water to drink. They really wanted a thorough analysis before they could give a definite opinion with regard to any water.

Mr. HORTON: Yes.

Mr. FARLEY: You did not take a simple test for lead; that would have been useful.

Mr. HORTON said they did not get the quantities sufficient. They could take one-tenth of a grain by the way he stated.

The CHAIRMAN said he took Mr. Horton's paper as representing the advisability of sanitary engineers having the ability to test under certain circumstances, without suggesting that the sanitary engineer should make himself an expert on the subject. At the commencement Mr. Horton said the engineer at the present time was loaded with matters upon which he had to have a knowledge, and to extend his knowledge was adding an almost unnecessary burden. But he certainly came to the conclusion before the paper was finished that what was suggested was a very simple measure, and to those who had the time it was a means of very greatly aiding them in their business. Of course an engineer was not considered a water expert, and if he found even the slightest suspicion that the water was more or less foul his duty would be at once to send to an expert whose opinion would be taken and worked upon. A vote of thanks had been proposed to Mr. Horton for his certainly able paper. When they were able to give more time to study it they would be able better to appreciate the ability he had shown in giving them the means of themselves trying those simple tests, and thus extend the power of their research in sanitary

matters, because there was no doubt that water was one of the things they must all look to as being necessary for the health and well-being of mankind.

Mr. DAVENPORT said he would point out that it would be well if they were taking water from a well that note should be taken of the general surroundings, for when he took a sample to an expert he generally liked plenty of detail.

The motion was carried, and a similar compliment was paid the Chairman on the motion of Mr. WELLS, seconded by Mr. DAVENPORT.

General News.

NOTICE.—On and after 31st March next the Annual Subscription to this Journal will be raised to 12s. 6d. to all NEW Subscribers. NO ADVANCE will be made to our friends whose names are entered on our Subcription list prior to that date, so long as they continue to Subscribe.

STROUD.—It is proposed to erect an isolation ward for the workhouse.

PEWSEY.—The District Council is considering a scheme for supplying Pewsey with water.

CREDITON.—Application is to be made to the Local Government Board to borrow £550 for the new reservoir.

LEEDS.—The City Council is considering a recommendation to purchase the Oriental Baths, at a cost of £18,000.

CANNOCK.—The Rural District Council has decided to purchase a steam roller at a cost of £330, with sleeping car £63, and water cart £28.

WHICKHAM.—The Urban District Council is considering the advisability of abolishing the ashpit at Marley Hill, and of erecting privies in each house.

EDINBURGH.—The Town Council has approved of sketch-plans of public baths, including Turkish chambers, to be erected at Portobello, at a probable cost of £18,000.

CLACTON-ON-SEA. — At a private conference between the Urban District Council and the directors of the gas and water company it is understood that an agreement was arrived at for the immediate purchase by the Council of the company's undertakings.

MAIDSTONE.—The monthly report of Mr. A. Adams, Medical Officer of Health for Maidstone, shows that in the past four weeks twenty-nine deaths have been registered in the borough, constituting a rate of only 11·05. No fresh case of typhoid has been notified since January 31st.

KEMPSTON.—The School Board, at a recent meeting, decided to close a well in the yard at the Up-end Schools in consequence of the unfavourable analysis of a sample of the water which had been submitted to a public analyst by the Medical Officer of Health for the urban district. Several other wells have been tested with varying results. Some are reported as unsuitable for drinking purposes, and in others the percentage of organic matter is high.

ENFIELD.—The Local Government Board has recommended the Loan Commissioners to lend the Urban District Council £26,700 for a new isolation hospital.

DUMFRIES.—A new clear-water storage tank is to be constructed by the Dumfries and Maxwelltown Water Commission, at an estimated cost of £3000.

BACUP.—At the last meeting of the Town Council it was resolved that application be made to the Local Government Board for sanction to borrow a further sum of £4486 for the construction of new filters at Sheephouse, and £1034 for the purchase of the site.

ASHINGTON.—The County Medical Officer, Dr. Hembrough, has spent two days in inspecting the urban district of Ashington. He visited the dairies and cowsheds, and the source of the water supply down the pit, and after his inspection he strongly recommended the adoption of bye-laws.

MILDENHALL.—The ninth annual report of the Medical Officer of Health on the health and sanitary condition of the Lakenheath and Worlington districts of the Mildenhall union, during the twelve months ending December 31st, states that from a sanitary point of view the year was an uneventful one.

RIPLEY.—At the last meeting of the Urban District Council the clerk was instructed to write to the Public Works Loan Commissioners with reference to the loan of £1000, in order to enable the Council to carry out the water scheme. The surveyor advised that this work be done in sections, and tenders are to be invited.

NEWCASTLE.—The Tyne Port Sanitary Authority is fully alive to the importance of close supervision of all vessels arriving from the Tees. At a recent meeting of the Hospital Committee in Newcastle it was agreed to appoint a second Medical Officer, so that vessels might be at once brought under inspection by day or night.

HARROGATE. — Mr. Shiress Will, Q.C., the umpire in the recent arbitration, has fixed the price to be paid by the Corporation for the undertaking of the Harrogate Water Company at £187,000. The expert valuations handed in on behalf of the claimants amounted to about £242,800, and those for the Corporation to about £168,600.

GUISBOROUGH.—At a meeting of the Guardians recently the question of taking steps to meet any outbreak of small-pox in the district was considered. It was agreed that the public vaccination officers should make special visits to the various vaccination stations for a month for the purpose of performing free vaccination with calf lymph.

CUPAR, FIFE.—Mr. George White, Sanitary Inspector, recently submitted an able and exhaustive report as to the sanitary condition of the town to the Police Commissioners. It is stated that he had never had to make a complaint about the cattle market, which was cleansed regularly after the weekly sale. The whitewashing of the cattle trucks on the railway embankment was done thoroughly. The management of the common lodging-houses was all that could be desired. The dairies and milk stores were all cleanly kept, and he had had no complaints as to the quality of the milk supplied within the burgh.

ROCHDALE.—The report adopted by the Town Council states that the Corporation would require £44,200 for the mains, pipes, monopoly of water—present and prospective value.

EASTBOURNE.—The Town Council has resolved to make an installation of the Reeves system at a few of their worst manholes in order to prevent further complaints of nuisance from these manholes.

MIDDLESBROUGH. — The small-pox outbreak appears to have been overtaken by the Authorities. The spread of the disease appears to have been checked, and it is now hoped and believed that it will not be necessary to utilise the new lunatic asylum as a small-pox hospital. The erection of temporary structures for the accommodation of small-pox cases is now being proceeded with as rapidly as possible.

WEST HAM.—At a recent meeting of the Urban District Council, the following resolution was, after a very uproarious scene, carried:—"That all female Sanitary Inspectors hereafter appointed by the Council shall receive the same salary, with the same increments, hold the same position, and be liable to perform the same duties—as far as difference of sex will allow—as the then last appointed male Sanitary Inspector."

MANCHESTER.—The improvement of Manchester thoroughfares and the development of the electric lighting undertaking of the Corporation formed the subject of a Local Government Board inquiry last week. The Corporation applied for a Provisional Order empowering it to borrow money for the purpose of making a new street from the junction of Long Millgate and Ashley-lane to Charter-street, and for the widening of Hanging Ditch; for sanction to borrow £16,000 for the electric lighting of the city, and £10,000 for the provision of sanitary conveniences.

Personal.

MR. W. P. JONES, Swansea, has been appointed surveyor for the Glyncorrwg urban district.

DR. S. A. SHIACH has been appointed Medical Officer for the Llanishen district of Cardiff union.

MR. W. J. NICOLL has been appointed Medical Officer for the fourth district of Chipping Norton union.

MR. A. A. BLAKISTON has been appointed Medical Officer for the fourth district of Shepton Mallet union.

MR. M. DUNN, of Selby, has been appointed gas manager for Goole, at a salary of £300 per annum.

T. G. EMERSON, M.D., has been reappointed Medical Officer of Health for the urban district of Wantage.

W. A. E. HAY, M.R.C.S., has been reappointed Medical Officer of Health for the rural district of Bridport.

MR. R. K. HAMILTON has been appointed Medical Officer for the Hasland district of Chesterfield union.

C. J. BENNETT, M.R.C.S., has been reappointed Medical Officer for the Hayfield Rural District, and Parish Councils.

W. T. DAVIES, L.R.C.P., M.R.C.S., has been appointed Medical Officer for the second and third districts of the Hertford Union.

H. W. ARBUCKLE, M.D., D.P.H., has been reappointed Medical Officer for the Stamforth sanitary district of the Thorne Union.

MR. THOS. GEORGE TAYLOR, C.E., Borough Surveyor of Douglas, has been appointed Surveyor for the town of Ramsgate, out of a large number of candidates for the post.

MR. J. W. WYNNE, who has been manager of the Milnthorpe gasworks for over two years, has been appointed to the secretaryship and managership of the Ambleside gasworks.

DR. WALTER E. JAMES, Abercarn, who holds the appointment of Medical Officer to the Abercarn Urban District Council, Magor Rural District Council, and St. Mellon's Rural District Council, has been elected Medical Officer and public vaccinator for the parish of Mynyddislwyn, in succession to Dr. W. H. Davies, J.P., retired.

Sewerage Schemes.

[TO MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

SANCTION for the extra sewerage loan of £1196 for East Molesey has been obtained.

THE Local Government Board has sanctioned the borrowing of £5000 for sewerage purposes at Wokingham.

A LOCAL Government Board inquiry has been held at Batley concerning an application of the Town Council for sanction to borrow £13,494 for works of surface-water drainage.

THE Local Government Board has sanctioned the borrowing of £16,500 for the purchase of land for the sewage purification scheme at Morley, and of £25,630 for the construction of the works.

THE Local Government Board has sanctioned the application of the Hendon Rural District Council to borrow £2200 for works of sewerage and sewage disposal in the parish of Great Stanmore.

A LOCAL Government Board inquiry has been held with reference to an application by the Winchester Rural District Council for permission to borrow £5000 for the purpose of carrying through a sewerage scheme for the parish of Bishopstoke.

THE Local Government Board has suggested certain alterations in reference to the Heysham sewerage scheme, which will increase the cost to £1500 from £1300. The Surveyor to the Lancaster Council has been instructed to obtain tenders.

A COMMITTEE of the Kent County Council recently recommended that the state of Chatham, which was still without a sewerage system, should be represented to the Local Government Board, but the Council deferred the matter for another year.

AT the last monthly meeting of the Benwell and Fenham Urban District Council, the Surveyor (Mr. Pattison) presented a special report as to the drainage of Benwell Towers. After detailing the tests he had applied and the results, he said the whole of the drainage system was faulty.

A COMMITTEE of the St. Faith's District Council was appointed recently to investigate into the reported polluted condition of a small stream which enters the main river about two miles above the intake of the Norwich waterworks, at Drayton. The investigation made was a searching one, and a report will be presented to the Council after the Committee has met.

ON Tuesday afternoon, the 15th inst., the foundation-stone was laid of the Sheffield pumping station works, in connection with the Walsall Wood sewerage scheme, which is being carried out by the Brownshills Urban District Council. The cost of the engineering works is about £11,700, and the population of the district served by the system is between 6000 and 7000.

A LOCAL Government Board inquiry has been held into a petition by the Rural District Council of Tadcaster for a Provisional Order to empower the Council to put in force with reference to certain lands required by it for the disposal of the sewage of the townships of East Tadcaster and West Tadcaster, the powers of the Land Clauses Acts, with respect to the purchase and taking of lands otherwise than by agreement.

A SPECIAL meeting of the Ilford Urban District Council was held last week with reference to the proposed sewerage scheme, when the approval of the Local Government Board was received of the scheme prepared by Mr. Santo Crimp, for the improvement and enlargement of the sewage works at Water-lane, and also sanction to a loan of £8000 for carrying out the works. The Clerk was directed to instruct the engineer, Mr. Crimp, to at once prepare the contract, drawing, specification, &c., and then to advertise for tenders for the said works.

AT the last meeting of the Farm and Sewage Purification Committee of the Sutton (Surrey) Urban District Council, an important report on the working of the bacteria filters from their commencement up to December 31st, 1897, was presented by Mr. C. Chambers Smith, C.E., M. San. Inst., Engineer and Surveyor to the Council, with plans, estimates, and a report recommending the adoption of additional coarse grain and fine grain bacteria filters of sufficient capacity to treat the whole of the sewage flow of the town. The Committee recorded on the minutes their high appreciation of the valued report, and decided to determine upon the extensions at their succeeding meeting.

THE Lichfield Rural District Council has received sanction from the Local Government Board to raise a loan to carry out the sewage scheme of drainage and sewage disposal for Chasetown, prepared by Mr. Edward Ives, C.E., of Derby. The Council's original scheme embraced the "Septic" system of sewage disposal, but the Local Government Board refused to entertain the idea of a loan. The disposal system now sanctioned is the "Universal," and the passing of the effluent over land.

THE Government has decided to immediately appoint a Royal Commission to inquire into the bacterial treatment of sewage. This important decision, which up to the present moment has, for no obvious reason, been kept a profound secret, has been arrived at on account of the pressure brought to bear by influential sanitary authorities, who are unable to comply with the Local Government Board's requirements as to the provision of what is officially deemed suitable and sufficient land for sewage disposal purposes. The remarkable success of the experiments at Exeter, Leeds, Sutton, and other towns have also moved the Government to action.

A SPECIAL meeting of the Ludlow Town Council was held recently to receive the report of the Sanitary Committee on the result of the recent conference between a deputation from the Ludlow Rural district Council and the Sanitary Committee of the Sewerage of East Hamlet and Ludford, and to make the necessary orders thereon. The Committee reported that it cannot see its way to recommend the Town Council to allow the Rural District Council to connect the sewers of these districts with the sewers belonging to the town, so that the sewage could be dealt with by the Town Council in a general scheme of sewage disposal, unless the borough boundaries be so extended as to include these districts within them.

Lighting.

THE gas manager of the Johnstone Corporation is of opinion that £15,000 is necessary to enable the gasworks to cope with the demand for illumination.

THE contracts for the generating plant in connection with the electric lighting scheme for the burgh of Leith have been accepted by the Corporation, and the work is now in hand.

THE annual report of Dr. Simpson, Medical Officer of Health for Perth, says that seemingly a new source of ill-health had arisen through their filthy gas. There probably had never been a more widespread and general complaint about anything, nor with greater reason, than there had been about the quality of the Perth gas. The smell that emanated from it on burning had been simply abominable. That it had been a nuisance, not only dangerous, but actually injurious, to health all over the town for the whole year had been abundantly proved by the prevalence of sick headaches and other evidences of loss of health caused by it.

AT a recent meeting of Portsay Police Commissioners it was explained that the sheriff had now authorised the adoption of the Gas Supply Act, and on the motion of the provost a committee was appointed to inquire and report as to the terms on which the present gasworks could be acquired.

CIRCULARS protesting against the proposal of the Gas Light and Coke Company to increase the price of gas have been issued by the Clerkenwell Vestry and the Holborn District Board of Works, and these bodies have also invited the other vestries affected to make a similar protest.

A LOCAL Government Board inquiry has been held to hear evidence of those interested in the application of the Selby Urban District Council, praying that a Provisional Order might be granted to it under the Gas and Waterworks Facilities Acts, and the Public Health Acts, to enable it to undertake certain extensions and improvements to the gasworks plant now owned by the Urban Council.

A SPECIAL meeting of the Hackney Vestry was held last week for the purpose of rescinding resolutions passed by the late Board of Works and also by the Vestry in regard to the subject of electric lighting in Hackney and also the dust collection of the parish, and to take into consideration the report of the Joint Committee of the Public Health and Electric Lighting Committees in reference to the advisibility of transferring the Electric Lighting Order to private persons or retaining the same.

THE ceremony of cutting the first sod in connection with the building of the new gasworks for Carluke and neighbourhood was performed by Mr. Alexander Pillans, J.P., on Monday, the 14th inst., on the site which has just been feued at Law Crossings. Mr. Pillans was asked to break the ground, which he did, and afterwards wished success to the undertaking, the company, and the contractors, and hoped the new work would be as beneficial to the company as it would be a boon to the community at large.

THE Gas and Electric Lighting Committee of Aberdeen Town Council recently had a conference with Professor Kennedy, London, on the question of the extension of the electric lighting system in the city. He expressed the opinion that the committee should not erect a sub-station, as he was convinced that the system could be more economically managed from one centre. He was glad that the committee proposed to extend the mains to the west end of the city, because, as it was a high-class residential district, it should pay well. With regard to the erection of destructor works for the utilisation of city refuse in the generation of electricity, he was of opinion that that was a matter worthy of careful consideration, and that the experiment might be attended with considerable success. The committee accepted the offer of Messrs. Mather, Platt, and Co., Salford, to supply a new 650-horse power engine and dynamo for £4147.

AT a recent meeting of the Gas Committee of the Hull Corporation, a letter was read from the chairman and secretary of the British Gas Company in Hull, whereby it was decided to supply gas to the Corporation for the area of the Kingston Gas Company, which had been purchased by the Corporation at 1s. 6d. per 1000 cubic feet. The Kingston Gas Company's price was 3s. per 1000, and the Corporation will re-sell to consumers at 2s. 8d. per 1000 cubic feet, so that consumers will at once get the benefit of the difference.

A LOCAL Government Board inquiry has been held at Haworth to investigate the District Council's application for a Provisional Order under Section 303 of the Public Health Act, 1875, varying the Haworth Act, 1872, as amended by a confirmation Act in 1880. The powers sought were threefold, viz.:—(1) "To hold and use for any purposes of the gas undertaking" 270 square yards of land adjacent to the gasworks recently bought from Messrs. John and Fred Brown at a cost of £38 5s.; (2) to "erect, alter, and maintain" such buildings on the land as may be thought necessary; (3) to borrow £2500 for extensions.

Notes and Queries.

[Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C.]

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

972.—SMOKE TEST MACHINE: NAME OF MAKE REQUIRED.—"A. S. J." writes:—"Would you be good enough to give me a few particulars of the 'Crow's Nest' smoke-generating apparatus? I have not seen the advertisement recently, so am unable to discover the method of working."

Answer.—We regret we are unable to oblige our correspondent with the information, as we do not know of the machine referred to. If any of our correspondents can furnish us with any particulars relating to it, we shall be pleased to describe it in a subsequent number.

973.—SANITARY INSPECTORS: STATISTICS REQUIRED.—"M. B." writes:—"Would you please oblige me with information on the following points:—(1) Is a Sanitary Inspector's life, considered from an insurance point of view, a first, second, or third-class life? (2) What is the death-rate among Sanitary Inspectors, and what comparison does it bear with that of other trades, businesses, or professions? (3) Can you give cases in which Sanitary Inspectors, disinfecting attendants, &c., have been known to contract infectious disease in the execution of their duty? (4) Also cases in which Sanitary Inspectors, disinfecting attendants, &c., have been known to carry infectious disease to their families?"

Answer.—(1) We regret we are unable to furnish the information. The practice of insurance companies varies in respect to classification; but if our correspondent were to communicate with a few insurance companies, he would, no doubt, be able to obtain the information. (2) We are not aware that any statistics have been published giving the death-rate among Sanitary Inspectors. (3) We are unable to do so. Doubtless there are, however, many such cases, as there are in the

medical and nursing professions, whose members are brought, similarly to the Inspector, in contact with infectious cases; but with proper precautions the risks are not so serious as are anticipated by many people. (4) Such information might be procurable by communicating with the Chief Sanitary Inspectors throughout the country, who would no doubt be able to furnish many cases. We know of no other method by which our correspondent could obtain the desired information.

974.—Municipal Corporations Act: Member Interested in Contract.—"R." writes:—"Will you kindly inform me if it is legal for a member of the Corporation to purchase iron manhole covers from the Corporation, and sell them to another tradesman in the town?"

Answer.—It is provided by Sec. 12 of the Municipal Corporations Act, 1882, that a person shall be disqualified for being elected, and for being a Councillor, if and while he has, directly or indirectly, by himself or his partner, any share or interest in any contract or employment with, by, or on behalf of the Council. We are of opinion that in such a case as that named by our correspondent a Councillor would be interested in a contract with the Corporation within the provisions of the section referred to, and that he would also render himself liable to a penalty of £50, as provided by Sec. 41 of the Act. An action to recover the penalty may, however, as defined by Sec. 224, only be brought by a burgess of the borough, and will not lie unless the plaintiff, within fourteen days after the cause of the action arose, served a notice in writing, personally on the person liable to the fine, of his intention to bring the action, nor unless the action is commenced within three months after the cause of action arose.

975.—Petroleum Acts: Local Authority.—"U. S. D." writes:—(1) "Will you please name the latest Act of Parliament regulating the keeping and sale of petroleum? (2) What is the definition of the term 'petroleum'? (3) Who are the proper Local Authority for the granting of petroleum licences within an Urban Sanitary District not being a borough? (4) Is it the duty of the Sanitary Inspector of an Urban Sanitary District to inspect petroleum stores, and take and test samples? (5) Where can the necessary testing apparatus be obtained?"

Answer.—(1) The Acts in force relating to petroleum are The Petroleum Act, 1871, The Petroleum Act, 1879, and the Petroleum Hawkers' Act, 1881. (2) The term "petroleum" is defined by Sec. 3 of the Petroleum Act, 1871, to include any rock oil, Rangoon oil, Burmah oil, oil made from petroleum, coal, schist, shale, peat, or other bituminous substance, and any products of petroleum, or any of the above-mentioned oils. (3) By Sec. 27 of the Local Government Act, 1894, district councils, whether urban or rural, are invested with the execution as the Local Authority of the Acts relating to petroleum. (4) Not unless he is duly authorised by the Local Authority as provided by Sec. 11 of the Petroleum Act, 1871. (5) Petroleum testing apparatus, for testing the flashing point of illuminating oils (Sir Frederick Abel's Government pattern as supplied to the Government Inspectors under the Petroleum Act, 1879,), may be obtained from the manufacturers, Messrs. Negretti and Zambra, Holborn Viaduct, London, E.C.; the price of the apparatus complete in box, for use with oil only or gas only, as may be preferred, £6 10s.

976.—Ambulance Carriages: Makers of.—"W. M." writes:—"We should be much obliged if you would kindly furnish us with the names of makers of ambulances such as would be suitable for a village."

Answer.—The following firms are manufacturers of ambulance carriages, viz.:—Messrs. Wilson and Stockall, County Ambulance Works, Bury, Lancashire; Messrs. Atkinson and Philipson, 27, Pilgrim-street, Newcastle-on-Tyne; Mr. Alfred Carter, Limited, Holborn Viaduct, London, E.C.; the Bristol Carriage and Wagon Company, Bristol; Messrs. Chalmers and Company, High-street, Redhill, Surrey. The St. John Ambulance Association, St. John's Gate, Clerkenwell, London, also supply and advise as to the construction of ambulance carriages.

977.—Inspectors of Factories: How Appointed.—"F. H." writes:—"I should be greatly obliged if you would inform me what steps I must take to become one of her Majesty's Inspectors of Factories. Is there any age limit? How often do vacancies occur? I should be glad if you can supply me with any information bearing on the appointment, such as duties, hours, salaries, &c."

Answer.—Appointments of Inspectors of Factories and Workshops are not open to competition. By Sec. 67 of the Factories and Workshops Act, 1878, the appointment, payment, &c., of such Inspectors, and their assistants, clerks, &c., is assigned to a Secretary of State—in this case the Secretary of State for the Home Department. Possibly, if our correspondent were to communicate with her Majesty's Chief Inspector of Factories, whose address is Home-office, Whitehall, London, S.W., he might be able to obtain the particulars required.

978.—Settling Tank: Defect in: How to Remedy.—"One in the Dark" writes:—"I have had a settling tank constructed, the bottom of which is formed with 5in. of granite slag and cement. Underneath the concrete are rubble stones. The bottom is above the surface of the ground. The tank will hold water until about three-quarters full, when it will begin to leak very rapidly until it is all run off within about 9in. Could you please tell me what I should do to make it hold water?"

Answer.—It would appear that the bottom of the tank is of insufficient strength to withstand pressure of liquid beyond a certain depth. It is also very probable that, if the tank has been constructed on "made" ground, or partly "made" and partly natural, that a crack exists in the bottom. The remedy will be to increase the strength of the bottom by increasing the thickness to 12in., and this should be done in concrete, mixed in the following proportions and well rammed after being deposited, viz.:—Two parts granite, broken to pass through a ¾in. ring, one part clean sharp sand, and one part Portland cement. Before the concrete has had time to set, the surface should be rendered with neat Portland cement mixed with water to make a stiff mortar, and applied with a plastering trowel and hand float, so as to work the cement into all the crevices of the concrete, but leaving no body or coat of cement on the surface. The steel plastering trowel is then used to give it a smooth surface, and the operation is then complete. We may add that it will be advisable to pick off the cement rendering on surface of wall to a height of 2in. or 3in. above the intended new floor level, so as to give a "key" for the new work, and the angles between floor and vertical walls must be splayed in cement.

979.—The Ducat Filter for the Treatment of Sewage.—"Surveyor" writes:—"I am a selected candidate for the office of Surveyor to appear before a Council which has decided to adopt Colonel Ducat's system of sewage purification. Will you be good enough to explain the principle and method of the system, as I may be questioned with reference to it?"

Answer.—The Ducat filter, which is at work on a small scale at Hendon, is one which is worked on the continuous flow principle. It is constructed above the surface of the ground, with concrete floors and with walls constructed of 3in. agricultural drain tiles and brick piers about 8ft. apart. Along the floor of the filter, and at every 2ft. in height and 1ft. apart, are also laid rows of drain tiles communicating with the open sides, in order to

introduce air to all parts of the filter. The total depth of the filter is about 8ft., the filtering material being gravel or coke arranged in layers, varying in degrees of fineness, the coarsest material being at the top of the filter and the finest at the bottom. The sewage is distributed evenly in a fine film over the whole surface of the filter, at the rate of 200 gallons to the square yard per day, and it passes through the breeze and reappears in an open channel formed all round the base of the filter. The filtrate is claimed to be a very satisfactory one. Particulars of the Ducat and other filters will be found in Spinks' "House Drainage Manual," price 5s.

980.—ABNEY'S REFLECTING CLINOMETER: USE OF.—"J. M." writes:—"Is Abney's reflecting clinometer level suitable for use in place of a Dumpy level, for taking levels for the preparation of plans and sections for drainage or water supply works? I understand the instrument is much cheaper and more convenient for carrying about, and otherwise suitable for anyone who only uses a level at intervals and over comparatively short distances. An illustration of your own as to its use, or any other hints or advice, will be appreciated."

Answer.—Abney's clinometer is not suitable for use in drainage work, where absolute accuracy is indispensable. The instrument is convenient for obtaining angles of acclivity or declivity. Descriptions of the mode of construction and working of this and other surveying instruments will be found in Usill's "Practical Surveying," price 7s. 6d., or Stanley's "Surveying Instruments," price 7s. 6d. The former book will be found valuable to our correspondent.

981.—NUISANCE FROM KEEPING PIGS.—"T. W." writes:—"An owner of nine houses rented a plot of land on the opposite side of the back street for his tenants. In this land one or two of his tenants kept pigs. About twelve months ago the Sanitary Authority complained of the pig-keeping as being a nuisance, owing to the styes not being drained, whereupon the owner of the houses constructed the drains, and the Urban Sanitary Authority were satisfied. This week, however, the owner has received a notice from the lord of the manor to give up the land which he sublets to his tenants, through the Sanitary Authority describing this enclosure as a nuisance. Now is it in order for the Sanitary Inspector to get the lord of the manor to give notice to this man to give up the land? The Sanitary Inspector has not given any notice of a nuisance to the owner of the houses, nor has he reported the matter to his Authority."

Answer.—The information before us is not sufficient for us to properly advise. Our correspondent does not show conclusive proof that the notices served by the lord of the manor are in consequence of a complaint made to him by the Sanitary Inspector. But even if such a complaint had been made by the Inspector, we do not see how his action can be considered "out of order." He would, in our opinion, be acting properly in the discharge of his duties.

Contracts Open.

The dates given below are the latest up to which tenders can be received.

ARDSLEY (NEAR BARNSLEY). — February 26th. — Scavenging.—Mr. Thomas Harper, surveyor, Stairfoot.

BAMBER BRIDGE (LANCS).—February 26th.—Night-soil —The Council Offices, Bamber Bridge.

BRENTWOOD (ESSEX).—February 28th.—Scavenging. —Mr. C. Edgar Lewis, clerk, Brentwood.

CHASE TOWN (LICHFIELD, STAFFS).—February 28th-March 9th.—Mr. E. W. Ives, C.E., 20, Albert-street, Derby.

RAWMARSH.—February 28th.—Removal of Night-soil, &c.—Mr. J. W. Bellamy, clerk, Council Offices, Rawmarsh.

WINCHESTER.—February 28th.—Re-draining.—Mr. W. J. Taylor, county surveyor, The Castle, Winchester.

HALIFAX.—March 1st.—Sewer.—Mr. F. Gordon, Engineer's Office, Clifton, Brighouse.

SHOEBURYNESS.—March 1st.—Removal of Refuse.—Mr. W. Stafford, High-street, Shoeburyness.

WATERLOO (LANCS).—March 1st.—Scavenging.—Mr. F. Spencer Yates, A.M.I.C.E., surveyor of the Council, Town Hall, Waterloo.

GRAYS (ESSEX).—March 2nd.—Sewer.—The Council Offices, 49, Windmill-street, Gravesend.

WATFORD.—March 2nd.—Sewers.—The Council Offices, 14, High-street, Watford.

WATFORD.—March 2nd.—Sewer Pipes, &c.—The Engineer's Office, 14, High-street, Watford.

KING'S LYNN.—March 2nd.—Sewers.—Mr. E. J. Silcock, C.E., borough engineer, King's Lynn.

LITHERLAND (LANCS).—March 2nd.—Removal of Nightsoil.—Mr. W. B. Garton, surveyor, Public Offices, Sefton-road, Litherland.

OLDHAM.—March 2nd.—Sewers, &c.—Mr. S. A. Pickering, A.M.I.C.E., borough surveyor, Oldham.

GAINSBOROUGH.—March 3rd.—Sewer.—Mr. Henry Riley, engineer and surveyor, Council Offices, Gainsborough.

DARTON (NEAR BARNSLEY).—March 5th.—Scavenging. — Mr. James Gibson, clerk, Post-office-chambers, 5, Regent-street, Barnsley.

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Vacancies.

BOROUGH SURVEYOR AND ENGINEER (MORLEY, February 26th).—For the Town Council. Salary, £200 per annum. Mr. R. Borrough Hopkins, town clerk, Town Hall, Morley.

BUILDING INSPECTORS (CROYDON, March 3rd).—For the Council. Salary, 50s. per week, with biennial increments of 5s. per week, until a maximum of 60s. per week is attained. Application forms to be obtained at the Borough Surveyor's Office, Town Hall, Croydon.

CLERK OF WORKS (PENISTONE, YORKS).—For the Urban Council. Clerk, Urban District Council, Penistone.

SURVEYOR, &c. (KNARESBOROUGH, February 28th). For the Urban District Council. Salary, £60 per annum for the surveyorship and £40 per annum for the inspectorship. Total salary, £100 per annum. Mr. Thomas Mainman, clerk, Council Offices, Knaresborough.

SURVEYOR (SHANKLIN, March 1st).—For the Urban District Council. Mr. J. Marsh, clerk, Council Chambers, Shanklin, I.W.

SURVEYOR (STAINES, February 28th).—For the Rural Council. Salary, £200 per annum, to include all travelling expenses. Mr. John Anthony Engall, clerk, Clarence-street, Staines.

SANITARY INSPECTOR (LONDON, W.C. (March 8th). For the Holborn Board of Works. Salary, £120 per annum. Mr. Matthew H. Hale, clerk, Holborn Town Hall, Gray's-inn-road, W.C.

SURVEYOR (LONDON, W., March 7th).—For the Vestry of St. Marylebone. Salary, £600 per annum. Vestry Clerk, Court House, Marylebone-lane, Oxford-street West.

COMPETITIONS.

WINCHESTER, March 31st.—Public Baths. Extension of Time.—The time for submitting plans for the public baths competition is extended to March 31st. Premiums of £25 and £15 will be awarded for the designs adjudged by the Council of sufficient merit, and placed first and second in order respectively. The premiated plans will become the property of the Corporation. Drawings and detailed estimate to be deposited at the office of Mr. Walter Bailey, town clerk, Guildhall, Winchester, marked "Swimming Baths," on or before March 31st, instead of 28th inst., as previously mentioned.

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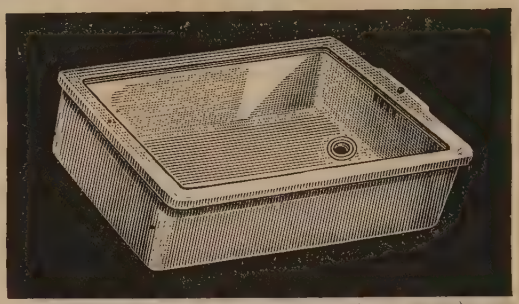

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NOTICE.—On and after 31st March next the Annual Subscription to this Journal will be raised to 12s. 6d. to all NEW Subscribers. NO ADVANCE will be made to our friends whose names are entered on our Subscription list prior to that date, so long as they continue to subscribe.

THE

Sanitary Record,

MARCH 4, 1898.

Notes.

Local Government for Ireland.

THE long-looked-for has come at last, and Ireland is now in a fair way to obtain a system of local government, similar to that which has met with such success in England and Scotland. The Government Bill, introduced into the House of Commons last week

by Mr. Gerald Balfour, was received on all hands with a chorus of approval that augurs well for its future. It is impossible in this place to give even the barest outline of the numerous provisions of this comprehensive measure; but those of our readers who are concerned with Irish local administration have doubtless acquainted themselves with the substance of the new proposals from other sources. In its main features the Bill follows on the lines of the English and Scotch Acts, with such modifications as are required by the peculiarities of the existing system in Ireland, withdrawing the control of local affairs from nominated bodies, and entrusting it to bodies popularly elected.

The Administrative Bodies.

There will be no Parish Councils, as the parish has never been in Ireland an area of local administration; but there will be County Councils, Urban District Councils, Rural District Councils, and Boards of Guardians, to which the powers and duties of the existing bodies will be transferred. The County Councils are to have certain powers of veto over expenditure initiated by the Rural District Councils, which will accordingly have the right of representation on the County Councils. The general powers of both kinds of bodies will be analogous to those of the similar bodies in the sister kingdoms. Six cities or towns—Dublin, Belfast, Cork, Limerick, Londonderry, and Waterford—will be constituted county boroughs, without much change in administration. In the case of other towns and boroughs, every place which is at present, or may become, an urban sanitary district, will be an urban district under the Bill, having its affairs administered by an Urban District Council, which will be the rating Authority. These Councils will be more independent of the County Councils than the Rural District Councils. But it is needless at present to enter further into the scope of the Bill. Opportunities will occur later on for discussing its provisions in detail. Meantime we shall content ourselves with congratulating the sister island on the prospect of possessing, by the spring of next year, a system of democratic local government such as we now enjoy.

The Promised Sewage Commission.

No Government proposal of recent years has, we take it, excited such widespread satisfaction among sanitarians as has the decision to appoint a Royal Commission to study the various methods for the disposal of town sewage. While it can hardly be said that the problem has yet reached the stage for a perfect solution, the progress that it has made has been such as to warrant the belief that that stage cannot now be far off. As to the importance of the question the consensus of opinion is unanimous. Of all the problems of sanitation which at present exercise the minds of chemists, doctors, and engineers, this problem is probably the one which engages the deepest interest and attention. But beyond that point unanimity stops. Of the three leading methods of treatment—by land, by chemical and mechanical precipitation, and by bacteriological or biological agency—no one has yet succeeded in completely ousting the others. Each system finds its advocates; each can claim to have produced successful results; finality is yet, however, to be attained.

The Need for the Inquiry.

In the present conflict of expert opinion, therefore, it is not surprising that Local Authorities, which are composed of men who are not experts, should be at a loss to determine which way lies salvation. What they want is more light—an exhaustive inquiry into the efficiency and cost of all the various methods, and a careful weighing and comparison of scientific opinion. The insistence of the Local Government Board on some land treatment, in addition to the chemical and other methods that may be employed, in opposition to the views of many eminent experts, has rendered it imperative that we should have an authoritative pronouncement on this all-important question. And therefore it is that the promised Commission will be welcomed by all who desire to see this matter probed to the bottom. As to the composition of the Commission, it is understood that a number of experts in different branches of science relating to the subject, as well as some persons of administrative capacity, have been selected, so that its membership is already practically, if not officially, settled.

The Case of Oswestry.

The experience of Oswestry, which has been described by the Mayor in an interesting letter to the *Standard*, affords a very instructive illustration of the perplexities and difficulties encountered by Local Authorities in dealing with this question. For a number of years the Town Council of that place have been in search of an effectual and economical method of purifying their sewage, and finally they engaged an eminent firm of engineers to report on the matter. But when they found that the scheme recommended, which included a sewage farm and sludge works, was to cost about £20,000, and would probably entail a sixpenny rate, they considered that the expense was prohibitive, and cast about for some cheaper mode. The Council ultimately decided to embark on some experiments on the lines developed by Mr. Dibdin. Mr. Wynne Roberts, the borough engineer, suggested that cinders screened out of the town refuse could be utilised as the filtering media, and that simple earthen embankments would suffice instead of the usual expensive walls. The suggestion was adopted, and the experiments yielded the most satisfactory results, from 90 to 95 per cent. of the impurities being eliminated, leaving a remarkably pure effluent. The Council were so pleased with the results of the experiments that they resolved to construct large works on similar lines. The works are expected to cost about £1500, exclusive of the land, and the annual cost to the ratepayers, after the completion of the works, will be a three-farthing rate, instead of the sixpenny rate that they were at first threatened with.

The Outbreak of Small-pox in Middlesbrough.

The energetic action of the Authorities in dealing with the outbreak of small-pox in Middlesbrough merits the highest commendation, but the ravages of the disease have already been most alarming, and the local tradesmen are suffering considerably from the consequent curtailment of business. The Board Schools are still open, but some of the Voluntary Schools have been closed. Last week the average

daily number of cases notified was about 30, the total number since the beginning of the outbreak being about 500. Almost the whole of the inhabitants of the town have been re-vaccinated, and the Sanitary Authorities have made a most liberal distribution of disinfectants; in one day 20,000 bottles of carbolic acid were given out. The origin of the outbreak is meantime rather obscure. Some reports attribute it to a case of small-pox in a travelling show. Others set it down to the trade with Bilbao, where the malady has been raging for some time, as a considerable number of vessels trade between Spain and the Tees. However this may be, it is satisfactory to learn that the rapid provision of hospital accommodation, in connection with which men have been working day and night, and the other measures taken by the Local Authorities, warrant the expectation that the outbreak will soon be stamped out.

The Plague in India.

The latest news of the plague in Bombay is slightly more reassuring. The number of deaths for the week ending February 18th was 1136, showing a decrease of eighty-four on the numbers for the previous week. As the Earl of Onslow, Under-Secretary for India, stated in the House of Lords last Friday, this is the first time for ten weeks that the weekly telegrams have not shown a progressive increase in the reported plague deaths in Bombay city. The first indication of a decrease is undoubtedly satisfactory; but in other respects, the account of affairs is still most distressing. Two more European nurses have been attacked; and one, a Miss McDougall, died on February 28th. She caught the contagion through bending over the bed of a patient, while seized with a fit of coughing, with the result that some particles of the sputum entered her eye. Then, a most unfortunate fire has destroyed three of the plague hospitals, assigned respectively to European, Hindu, and Parsee patients; the nurses' quarters were also destroyed, and the six English nurses lost all their property. Luckily, the patients were removed in safety; but three of the Hindus died subsequently, from the shock of removal.

Worse than last year.

Altogether the conditions are said to be worse than they were last year. The reported plague deaths in Bombay for the three weeks ending 28th January, 4th February, and 11th February last were 840, 1004, and 1220 respectively. Last year the figures for the corresponding weeks were only 402, 607, and 803. In comparing these figures, however, it must be borne in mind that the exodus produced by the panic last year reduced the population of the city to 450,000, whereas this year the population is estimated to be about 800,000, which is more like its normal condition. The absence of panic this year, indeed, has been the one redeeming feature in connection with the present visitation, and this must have been of very great assistance to the Authorities in the enforcement of the sanitary regulations.

The Measures of Inoculation.

The system of preventive inoculation of Dr. Haffkine has been largely taken advantage of. Lord Onslow states that the Government of India consider that the results of his experiments at Damaun have been so encouraging that hopes are entertained that this prophylactic method may prove to afford a real and efficacious protection against the disease. They recommend that every opportunity should be taken to test its efficacy, and Local Authorities have been directed to procure a supply of serum for the use of persons who desire to have themselves inoculated. Dr. Haffkine himself has been instructed to proceed to Baroda to carry out inoculation there. On this and other matters full information will shortly be accessible to everyone, for a Blue-book dealing with the whole subject is at present in course of being published, and will be ready almost immediately. It is sincerely to be hoped that the heroic efforts of the Government to check the spread of the disease and mitigate the extent of the suffering, and the labours of the devoted band of doctors and nurses, who have carried on the struggle at the risk and sometimes with the sacrifice of their lives, will soon meet with the reward that they deserve.

Public Health Chair for Glasgow University.

The feeling that the time is now ripe for the establishment of a Chair of Public Health in the University of Glasgow, the need for which we emphasised last week, is likely ere long to take some practical shape. The resignation of Professor Simpson affords an opportunity for separating the subjects of medical jurisprudence and public health, which have hitherto been taught together, such as may not occur again for a long time. Sir William Gairdner, whose eminent services to the cause of hygiene have found fitting recognition in his recent knighthood, has taken the matter up with characteristic zeal and earnestness; and alike in University circles and before the public he has been advocating the need for this important chair. In a well-reasoned memorandum which he submitted the other day to the University Court he lays stress on the important place Glasgow has taken during the last thirty years among the cities of the kingdom in the development of sanitation as a department of municipal organisation, so that "from a squalid and unwholesome notoriety as one of the most degraded of cities in this respect, it has emerged into the position of one of the most advanced in dealing with all the manifold problems of prevention."

The Civic Example.

Sir William points out in detail the successive steps that have been taken by the municipality in its progress towards this great ideal, and proceeds to argue that in a city "where all the known machinery for the prevention of disease is now in operation under the superintendence of a Medical Officer of the highest reputation and a staff of Inspectors hitherto never excelled, if indeed equalled, it cannot but have struck many persons as an anomaly that the teaching of this subject has so greatly lagged behind the actual civic example." And he goes on to ask, "Why has the University, which ought to be the centre of light and leading, so that all great questions affecting the community might be expected to be adequately represented in teaching, remained in almost the same state as regards this overwhelmingly great subject as it was forty or fifty years

ago?" We must have a Chair of Public Health, he adds, at all costs, and now is the time to effect this.

The Equipment of the Chair.

These are weighty words, and coming as they do from a man of the eminence of Professor Gairdner, we have no doubt that they will carry great weight with the University Court, with whom the initiative rests. In a wealthy city like Glasgow, the difficulty of providing the necessary funds should not prove overwhelming. For beyond all things, the Chair would have to be liberally endowed and adequately equipped. Not only would there require to be such a salary attached to it as would induce a man of ability and experience to devote his whole time to the subject, but it would be imperative also to have an independent laboratory equal to the highest requirements of the day. Thus only would it be possible to raise the subject of public health in the scheme of University instruction to "the rank required alike by the progress of events and the great extension of scientific knowledge, and adapted to the requirements not only of medical students and candidates for a diploma in public health, but of all, including Sanitary Inspectors and men engaged in local government, who may be expected in future to participate in the desire for systematic and practical teaching in this great department."

A Surveying Bicycle.

Surveyors will be interested to know that a new machine has just been brought out which will be probably most useful to them. Like most startling ideas, the invention has been developed in America. By means of an attachment the exact topographical characteristics of a road may be ascertained with no further exertion on the part of the surveyor than to ride along the road in question. The rider may travel as fast or as slow as he likes, but when he has finished his ride it is stated that the machine will have recorded every gradient or hollow traversed of his route on a long strip of paper which forms part of the attachment in question. The mechanism is claimed to be very simple, and can be attached to any cycle.

Salford Sewage Purification Experiments.

In our issue of last week will be found—on page 199—the report of an interesting paper on this subject, given by the deputy borough surveyor of Salford. At Salford as elsewhere, following on the lines of the Barking filter, biological filters have been in work for several years for the treatment of the effluent from chemical precipitation tanks, with the usual record of success. Indeed, if the figures given are correct, we believe it will be found that the work effected by the Salford biological filters is found to exceed in a very unaccountable measure that done by any other biological filters of which we are aware. The Barking filter was found to produce the most satisfactory results when worked at the rate of one million gallons per acre per day, or 206½ gallons per super yard, but the Salford filters are asserted to have produced good results when worked for twelve months at the rate of 1000 gallons per super yard per day, which is equivalent to 4,840,000 gallons per acre, or nearly five times that which, under the hands of an able chemist, could be done by the Barking filter; and at the present time the Salford filters are being worked at the rate of 700 gallons, or nearly 3½ million gallons per acre per day.

It would be interesting to very many of our readers, we are sure, if Mr. Whyatt would furnish the chemical analyses of the filtrates produced by this remarkable rate of working, for although the results are announced as being "good," we are bound to observe that this qualification is one of very varying degree. Incidentally, it may also be asked why, if the rate of 1000 gallons working was "good," it has been reduced to 700 gallons per super yard? When we mention that the rate of filtration through the sand filters of the London water companies is 540 gallons per square yard per twenty-four hours it will be seen that there is room for grave doubt as to the accuracy of the figures in the Salford experiments. There are circumstances in connection with each kind of filter which require to be taken into consideration, but these have not been overlooked by us. Another notable feature in the Salford experiments is that the filters are, we are told, worked on the "constant" system as distinguished from the ordinary bacteria filter, the success of which is most marked when worked "intermittently." Altogether we are bound to admit that the statistics produced relating to the working of the Salford filters are extremely interesting, and while we hope their correctness may be confirmed, we feel it advisable to reserve judgment until additional particulars and analyses are forthcoming, which we hope will be the case.

Health Lectures.

We have pleasure in drawing attention to a useful and interesting course of lectures to be delivered in the Lecture-room of the National Health Society, 53, Berners-street, on "Public Health Law." The date of the first is the 22nd inst. It deals with the growth of sanitary legislation, and gives information as to the law with regard to infectious diseases. On the 25th inst. the lecturer, Miss A. Ravenhill, will treat of the practical application of the health laws in every-day life, directing her remarks to the management of the house. The third lecture deals with the health of workers in factories and elsewhere; and the fourth will be a practical comment on the machinery for securing healthy conditions in towns and villages. Under the auspices of the same society, Dr. Schofield will deliver a series of six lectures in the Church House, Porchester-terrace, on "Domestic and Personal Hygiene."

Leyburn.—The Rural District Council has instructed Mr. William Spinks, C.E., of Leeds, to prepare a scheme of water supply for the district of Finghall.

Tadcaster.—The Rural District Council has approved the scheme of sewerage and sewage disposal for Stanks and New Manston, prepared by Mr. William Spinks, C.E., of Leeds, and has forwarded the plans to the Parish Council for its consideration.

NOTES ON PRACTICAL SANITARY SCIENCE.

By WILLIAM H. MAXWELL.

Assistant Engineer and Surveyor, Leyton Urban District Council, Author of "Drainage Work and Sanitary Fittings," "Ventilation, Heating, and Lighting," &c., Certificates of the Association of Municipal and County Engineers, and Sanitary Institute.

No. 51.—REFUSE DESTRUCTORS.

(Continued from page 195.)

The Meldrum Furnace.

The Meldrum patent "Simplex" destructor is a modern apparatus manufactured by Messrs. Meldrum Bros., of Manchester. In this furnace, it is claimed, ordinary town's refuse will give a sufficiently high temperature to utterly decompose all noxious material, nothing but harmless and inoffensive gases passing up the chimney, the solid residue consisting entirely of hard clinker with a little ash. When it is desired to utilise all the available heat for steam-raising a special internally fired-steam generator is employed.

Ordinarily, the furnaces are fed by hand, but hopper feeding may be arranged if required. A forced draught is used in connection with the furnace, but no cremator is considered necessary, owing to the high temperature of the cells.

From the accompanying figures (17 and 18) it will be observed that four grates are placed side by side and separated only by dead plates, the ashpit, however, being divided in four parts, each separately fed with a supply of air under pressure, preferably by steam air blast. The destructor, therefore, is practically a single cell, fed and cleaned in four places at regular intervals, so that an approximately constant temperature may be anticipated.

The escaping gases either pass away from the back of each fire-grate into a common flue leading to boilers or the chimney, or are conveyed sideways over the various grates, and thence over a common fire-bridge towards the boilers or chimney. After passing the fire-bridge it will be seen there are five rows of baffle pillars arranged to divide and break up the current of hot gases; the pillars remain constantly at a bright red or white heat, and take the place, it is claimed, of the cremator furnace commonly used in the older destructor installations. A bye-pass is, of course, provided in order that the furnaces may be used without the boilers. The patentees recommend the four grates be laid down as shown in the accompanying illustrations, but fewer or more may be provided to suit circumstances. One or more of the grates may be disused without interfering with the working of the remaining portion of the destructor.

The main object of the "Meldrum" furnace, which may also be applied to every description of boiler and are now to be found fitted in almost all parts of the world, is to economise the cost of evaporation by the use of the commonest and poorest kinds of fuel, as coal or coke dust, ashpit refuse, &c.

The ashpits are closed by a cast iron plate, fitting air-tight, and provided with an air-tight door for removing the fine ash. Two patent steam jet blowers are provided for each furnace, lying within the ashpit, and fixed to the ashpit front. Steam is supplied to the two blowers from one steam pipe, the air blast being regulated at will by a steam cock or valve. The blowers are the simplest form of jet apparatus made, and use no more steam than necessary to preserve the bars, and, it is said, less than that evaporated from the water bath adopted in some systems for keeping the bars cool. The blowers are constructed to give any required pressure of blast, to 6in. water column and upwards for special circumstances, but, as a rule, no more than 1in. to 1½in. is required. Some of the advantages claimed for this system of forced draught are:—Any kind of fuel, however inferior, can be burnt; no tall chimney is required; evaporative power increased; clinkers are prevented from adhering to the fire-bars; the fire-bars are preserved.

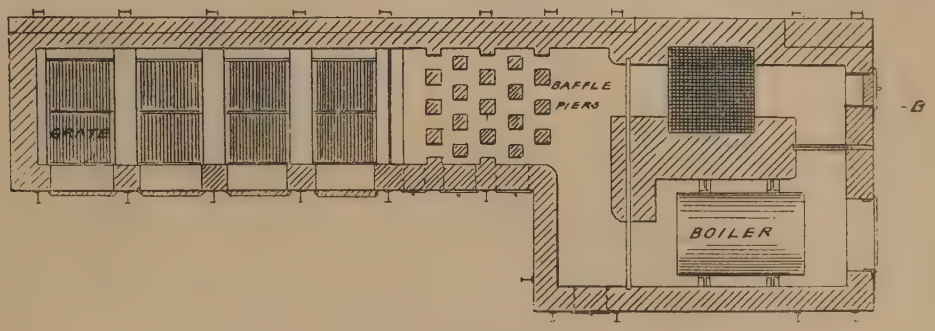


Fig. 17.—"Meldrum" Destructor. Plan.

The patent fire-bars (see Fig. 19) are provided with a special locking arrangement to prevent any bars being accidentally lifted when cleaning; this avoids burning, and in consequence the bars, with judicious use, will last for many years. The bars are spaced under ⅛in. apart, so that nothing of value can fall through. The saving of fuel, in the case of ordinary boiler furnaces, from this source alone, is said to more than cover the cost of steam for working the blowers.

At Basingstoke the sewage of the town is being pumped by means of power derived from the burning of town refuse in Meldrum's forced draught furnaces, and on November 17th, 1893, nine hours' pumping took 23 cwt. 2 qr. of refuse to keep up 45 lb. pressure of steam, which lifted 274,000 gallons of sewage 100ft. high.

In regard to the question of the number of

"Meldrum" cells required proportionately to any given population, if we take the annual production of house refuse per 1000 inhabitants at 200 tons, then a single "cell," that is a grate 5ft. by 18ft., having four ashpits, and burning at an assumed average rate of 40 lb. per square foot per hour, would consume (90 square feet × 40 lb. × 24 hours) about 38 tons per day of 24 hours, or per year of 300 days = say, 10,000 tons. Consequently, if this rate of consumption be uniform and constant throughout the year, such a cell or destructor should suffice for $\frac{10,000}{200} = 50,000$ people.

The heat derived in indicated horse-power per cell would, theoretically—assuming a maximum duty of 2 lb. of water evaporated per lb. of refuse consumed—be equal to $\frac{90 \text{ sq. ft.} \times 40 \text{ lb.} \times 2}{20} =$ 360-horse power continuously per cell at 20 lb. steam per 1-horse power per hour.

A height of chimney shaft of 40ft. is said to be ample for the requirements of the "Meldrum" furnace; and the temperature in the cell if fitted with regenerator may be taken as averaging about 2000 deg. Fah.

A four-cell destructor has been working at Rochdale for some three years, and cells are being fitted at Hyde, near Manchester; also four of the cells, or rather one four-ashpit destructor is now being erected, attached to two Lancashire boilers at the sewage-pumping station, Hereford.

In a letter appearing in the *Contract Journal*, of March 17th, 1897, in connection with the recent Cardiff Report on the Disposal of Towns' Refuse, it is observed that Mr. Harpur, Borough Engineer, Cardiff, concludes that town refuse will not make steam beyond a pressure of 70 lb. per square inch; but, it is further stated, Meldrum Brothers are prepared to guarantee to evaporate steam at 180 lb. or 200 lb. pressure, the fuel being unscreened town's refuse.

The actual pressure maintained at Rochdale is given at 110 lb. per square inch. Electrical engineers usually desire a pressure of about 150 lb. to 160 lb., and, it is claimed, a destructor on the "Meldrum" principle would maintain this pressure without difficulty.

In regard to the question of steam, the following evaporative tests will be of interest:—

Evaporative Tests made on a Lancashire boiler, 28ft. by 7ft., flues 2ft. 9in. diameter, fitted with "Meldrum Furnaces" at the *Salford Sewage Works*, Mode Wheel. Fuel used, unscreened ashpit refuse.

Date of test	Feb. 19 and 20, 1895.
Duration of test	14 h. 10 min.
Weight of unscreened ashpit refuse burned ...	18,704 lb.
Average steam pressure ...	50·5 lb.
Average temperature of feed-water	42·9 deg. Fah.
Water evaporated during test	36,000 lb.
Refuse burnt per hour... ...	1320 lb.
Water evaporated per hour...	2540 lb.
Water evaporated in lbs. per lb. of refuse, actual conditions	1·9 lb.
Water evaporated per lb. of refuse, from and at 212 deg. Fah.	2·28 lb.

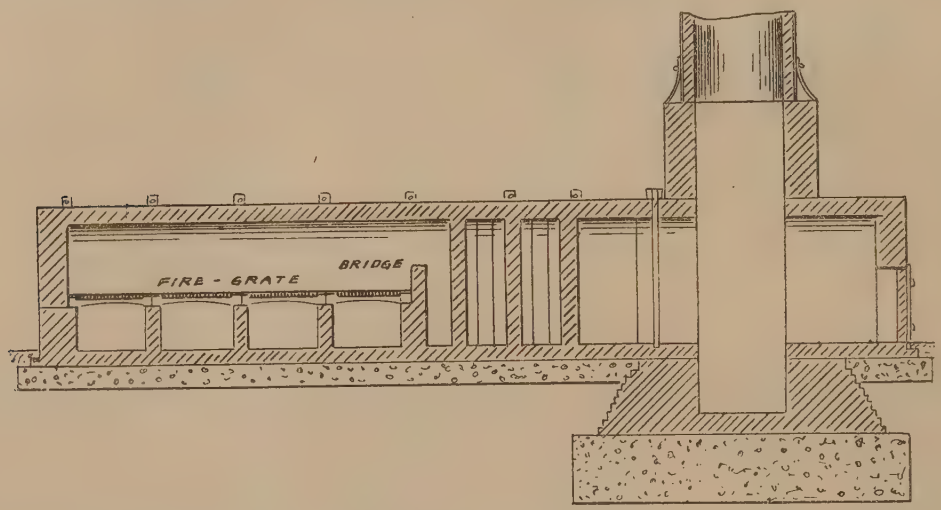


Fig. 18.—"Meldrum" Destructor. Section.

Evaporative Test of unscreened ashpit refuse burned in Meldrum furnaces, fitted in front of two Lancashire boilers 30ft. by 8ft., with two flues of 3ft. diameter, at the *Rochdale Sanitary Works*, March 1st, 1895.

Duration of test	6 hours.
Average steam pressure ...	113 lb.
Average temperature of feed-water	53 deg. Fah.
Total water evaporated ...	4207 gallons.
Total refuse burned	11·4 tons.
Total residue (clinker)... ...	4·15 tons.
Temperature in combustion chamber at 4 o'clock, tested with Siemens' Pyrometer	1988 deg. Fah.
Ditto, ditto, at 4·30 o'clock after clinkering and feeding	1290 deg. Fah.
Water evaporated per boiler per hour	350 gallons.
Refuse burned per boiler per hour	2123 lb.
Water evaporated per lb. of refuse (actual) ...	1·64 lb.

Water evaporated per lb. of refuse, from and at 212 deg. Fah.	1·97 lb.
Percentage of clinker to refuse	36 per cent.

Blowers supplied with steam at 55 lb. pressure from separate range of boilers.

Mr. Stevenson Macadam, Ph.D., F.I.C., writing in the *Journal* of the Society of Chemical Industry[132] upon refuse destructors, observes that his inspection of this destructor at full work satisfied him "that an excellent temperature could be got up and maintained in the various grates when all the doors were closed, but the mode of charging the respective grates by hand feeding, with the doors open, led to the entrance of much air into the combination, which must necessarily have a cooling influence on the whole, and lessen the efficiency of this destructor for consuming the smelling gases evolved from the foul garbage, especially when the newly-charged grate is near the chimney end of the combination." It should, however, be noted that after passing the fire-bridge the gases come in contact with the baffle pillars above described which if maintained at a "bright red or white heat" must have an important effect towards ensuring the perfect combustion of all offensive vapours.

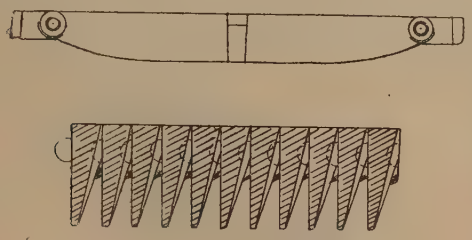


Fig. 19.—The "Meldrum" Firebars.

At Rochdale is a destructor of this class, designed by Mr. Brookman, with Meldrum's grates and steam jet blowers. The cost for labour is put down at 10d. per ton. Three men can dispose of 10 tons of refuse in ten hours in each of the two cells; this, with wages at 25s. per week per man gives 7½d. per ton for labour at the furnaces—adding to this a proportion of the expenses of supervision, &c., making the cost 10d.

THE SANITATION OF DOMESTIC BUILDINGS.

By Frank Latham, C.E., M. San. Inst., &c., Assistant Surveyor, Borough of Margate.

CHAPTER V.

INSPECTION CHAMBERS.

Inspection chambers or manholes are shafts constructed in the course of drains, and conducting thereto for the purposes of supervision and cleansing, so that in the event of obstruction in, or accident, such matter may receive immediate and effective attention. Inspection chambers are, as a general rule, placed at angles in drains, or where junctions occur and are fitted with sealing covers, thus preventing the escape of air or gas, and although they may not appear imperatively necessary in cases of small and simple systems of house drainage, still it is most desirable that access to all drains should be thus readily obtainable. Inspection chambers should in every instance be provided at both ends of the length of drains which pass under houses or in immediate proximity to a water supply, and in situation of similar importance

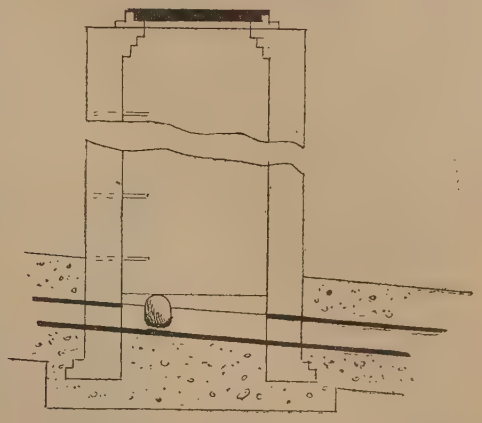
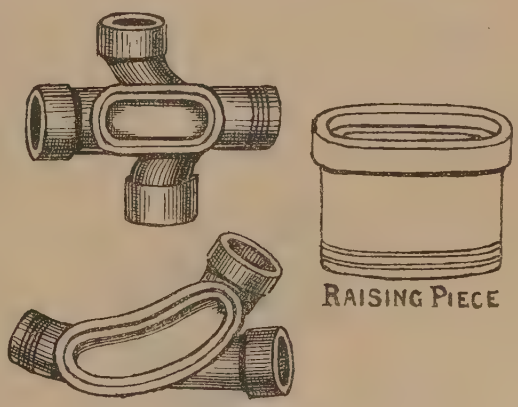


Fig. 41.

in order that occasional examination of such drains may be made and their soundness ascertained. (Fig. 41.) In the absence of means of easy access it would be impossible to efficiently and satisfactorily conduct such examinations without incurring much expense and delay, by excavating the ground and opening down to the drains for the purpose. Inspection chambers ought also to be placed at every point where the drain deviates in its course to any great extent, from the direct line, and drains should be so planned that as many branch drains as possible converge to and connect up by means of open bends within the chamber. When, however, it would require to extend branch drains to any considerable length to form this connection, it is better that inspection pipes should be employed in such cases. These inspection pipes are ordinary pipes with an opening at the top; they are particularly useful in providing means for examination of branch drains, and should be regularly used for that purpose. (Figs. 42 and 43 and raising piece.)



Figs. 42 and 43

In the cases of long lengths of house drains, it is requisite that inspection chambers be provided at

[132] March 31st, 1893.

frequent intervals in their courses to afford proper supervision and control. It is advisable, moreover, to place an inspection chamber in connection with intercepting traps upon the house side of the trap,

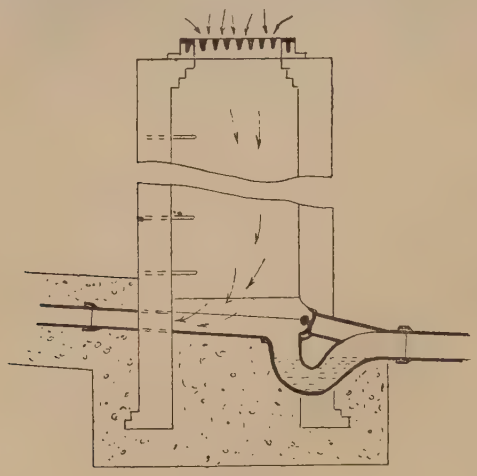


Fig. 44

so that in the event of its becoming choked as sometimes happens, ready access and relief can be at once obtained. (Fig. 44.)

These chambers should be constructed square in plan, with walls of good hard stock bricks, or other non-absorbent materials 9in. in thickness, on good footings, and in cement mortar throughout, and

Fig. 45.

with proper struck joints. When deep, step irons should be built in on one side of the wall to form a ladder. (Fig. 45.) The floor of the shaft should be of 9in. of good Portland cement concrete properly rammed to the levels required for the channels. The main invert channel should be laid with correct levels, and embedded

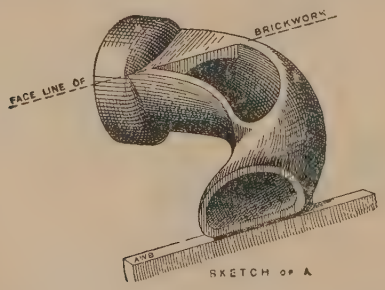


Fig. 46.

in fine concrete which should be extended to the sides of the chamber, with a good fall to the central main drain, and well benched up in cement. The sides of the chamber should be rendered in cement to the height of a few feet above floor level, and at the top of the chamber a square inspection cover frame should be fixed, the brickwork being corbelled over if necessary. The main invert channels used in these chambers should be of the same size, and laid at the same gradient and level as the drain. The open channel bends should be constructed so as to prevent the sewage splashing over the channel and depositing

Fig. 47.

on the sides, or on the benchings and corners, thereby rendering the inspection chamber filthy and unsanitary. To obviate this it is necessary to use channels specially manufactured for that purpose, the old system of employing ordinary semi-circular channels not being continued.

Jones and Sykes' patent channel bends (Fig. 46) have been designed to deliver the sewage into the main channel in a cleanly and efficient

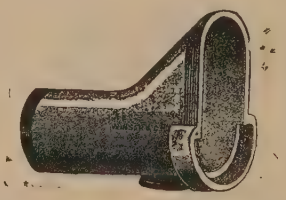


Fig. 48.

manner, without creating any undue disturbance in its regular flow. Winser's channel pipes (Fig. 47) are constructed with a similar object, and are very satisfactory in operation. In these the outer side is carried higher than the inner and curved inward, thus counteracting the tendency of the sewage to overflow on that side and preventing its so doing. This firm also manufacture a special drain chute for inspection chambers. (Fig. 48.) This is a pipe

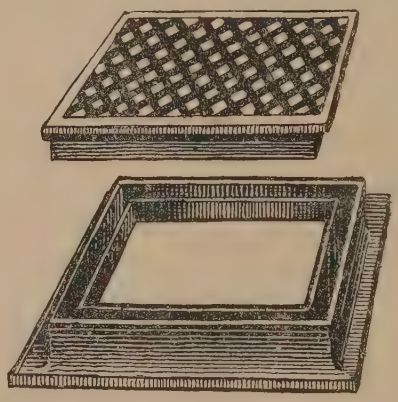


Fig. 49.

the upper side of which is opened to form a hood at the socket end, and is useful as the first outlet pipe from open channels. It affords easy access for the cleansing rods.

Inspection chambers should be covered with proper iron sealing covers, such as Adams'

Crappers', or Jones' (Fig. 49), and have a flanged edge fitting into a groove in the frame. This groove should be run with Russian tallow in order to render the fitting air-tight, and as drain air is apt to accumulate in inspection chambers, it is advisable to place an air inlet (such as the mica valve ventilator) at the top of the chamber in order to maintain a current of air through it. Double sealing covers are to be recommended, such as Jones' patent. (Fig. 50.) When the drain is situate at a short distance from the surface of the ground, the use of inspection pipes and eyes may be adopted in lieu of inspection chambers. These pipes and

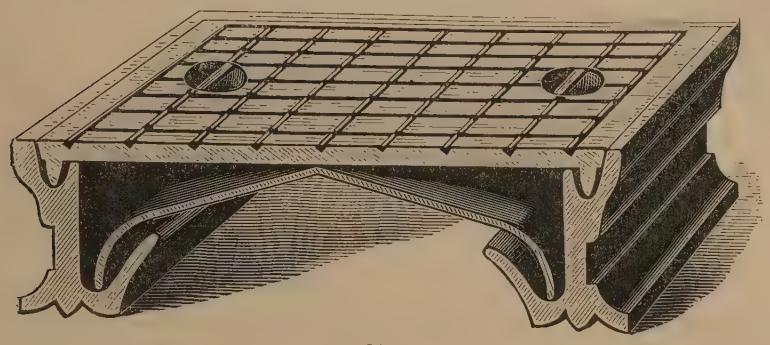


Fig. 50.

eyes are manufactured in a variety of shapes, but in the best forms the sides of the pipes are brought up higher than usual, and constructed with rectangular openings above the ordinary water line. These openings should be fitted with locking covers to prevent any internal pressure from bursting them open. Circular inspection eyes at the ends of drains and other places for cleansing and flushing purposes should be provided with screw stoppers and blocks, and by the use of Russian tallow between the joints they are rendered effectually air-tight.

THE SUCCESS OF VACCINATION AND OTHER PREVENTIVE MEASURES IN SMALL-POX.

By MEREDITH YOUNG, M.D., Mast. Surg., D.P.H., Medical Officer of Health and Med. Supt. Crewe Corporation Hospitals.

THE figures quoted in this article are based upon my own observations on 150 cases of small-pox when Medical Superintendent of the Brighouse and District Joint Hospital (Yorks). These cases, classified according to their state as regards vaccination were as follows:—

36 cases never vaccinated;
101 „ once vaccinated;
9 „ re-vaccinated; and
4 „ doubtful.

I propose to consider with reference to each class (1) the total mortality and the mortality at various age periods; (2) the nature of attack in each class as a whole and at various age periods.

I.—In the unvaccinated class there were 36 cases and 11 deaths recorded; the mortality was thus 30·55 per cent. of the cases. In the once-vaccinated class there were 101 cases with 5 deaths, the case-mortality thus being 4·95 per cent. In the re-vaccinated class there were 9 cases with no deaths; and in the doubtful class 4 cases, with two deaths. Thus the mortality in the unvaccinated class was slightly more than six times as great as in the once-vaccinated class.

Taking now the mortality at different age periods in the never-vaccinated and the once-vaccinated classes, and excluding three cases under three months of age and never vaccinated for the sake of absolute fairness, we find, as the following tables will show, (1) that the cases in once-vaccinated persons under 20 years of age were very few; (2) that no death occurred under the age of 30 years; (3) that in the never-vaccinated class the largest number of attacks were at ages under 10 years, and that 7 out of a total of 9 deaths occurred within the first ten years of life; (4) that the case-mortality in the once vaccinated never reached 16 per cent. at any age, whilst in the re-vaccinated the *lowest* case-mortality was just over 16 per cent. Had the rate of mortality been the same in the once vaccinated as in the unvaccinated, the deaths amongst vaccinated persons would have been 27 instead of 5.

It must be borne in mind, too, that the vaccinated class includes a number of cases—nearly one-sixth—in which the vaccination marks were decidedly poor.

Once-vaccinated cases.

Ages in years.	Total attacks.	Total deaths.
0— 1	2	0
1— 5	2	0
5—10	2	0
10—15	3	0
15—20	6	0
20—30	31	0
30—40	36	2 (5·55)
Over 40	19	3 (15·7)
All ages	101	5 (4·95)

Unvaccinated cases.

Ages in years.	Total attacks.	Total deaths.
0— 1	4	2 (50·0)
1— 5	12	4 (33·3)
5—10	6	1 (16·6)
10—15	5	0
15—20	2	0
20—30	2	2 (100·0)
30—40	1	0
Over 40	1	0
All ages	33	9 (27·27)

The figures in brackets give the case-mortality per cent., but of course the figures are only small for such calculations.

II.—Turning now to the nature of attack in the several classes as a whole, and in the same classes at different age periods. (1) Of the 33 unvaccinated cases 13 were discrete and 20 were confluent attacks. (2) Of the 101 once-vaccinated cases, 85 were discrete, 13 were confluent, and 3 were hæmorrhagic attacks. (3) Of the 9 re-vaccinated cases all were the mildest possible discrete attacks, the worst case having but eight spots. (4) Of the

4 "doubtful" cases 1 was discrete, 2 confluent, and 1 hæmorrhagic. Thus, taking the proportions of discrete and confluent cases to total cases in each class, we find that in the once-vaccinated the discrete cases were in double ratio to such mild cases in the never-vaccinated, and that the confluent attacks in the never-vaccinated class were nearly five times greater in proportion than among the vaccinated.

The nature of attack in the once-vaccinated and never-vaccinated classes at different age periods is shown in the following tables :—

Once Vaccinated.

Age in years.	Character of attack. Discrete.	Confluent.	Hæmorrhagic.	Deaths.
0— 1 ...	2	0	0	0
1— 5 ...	2	0	0	0
5—10 ...	2	0	0	0
10—15 ...	3	0	0	0
15—20 ...	5	1	0	0
20—30 ...	29	2	0	0
30—40 ...	31	5	0	2
Over 40 ...	11	5	3	3
All ages	85	13	3	5

Unvaccinated.

Age in years.	Character of attack. Discrete.	Confluent.	Deaths.
0— 1 ...	2	2	2
1— 5 ...	5	7	4
5—10 ...	3	3	1
10—15 ...	2	3	0
15—20 ..	1	1	0
20—30 ...	0	2	2
30—40 ...	0	1	0
Over 40 ...	0	1	0
All ages ...	13	20	9

From these tables it will be apparent (1) that the more severe cases did not appear in the vaccinated class until a comparatively late age, and that as age advanced the number of severe cases increased. The occurrence of three hæmorrhagic cases at ages over 40 is to be noticed ; the exact ages of these patients were 43, 45, and 59 years. (2) That in the unvaccinated class the greater number of severe attacks were at early ages.

The facts as to the re-vaccinated cases are set out in the following table :—

Age in years.	Sex.	Character of Primary Scars.	Character of Attack.
35	F	3 medium sized, foveated.	4 spots.
37	F	1 ditto, ditto	8 spots.
38	M	1 ditto, slightly foveated.	6 spots.
22	M	2 ditto, ditto.	7 spots.
29	F	Not observed.	Few abortive spots.
29	F	Ditto	Ditto.
22	M	4 large sized, foveated.	4 spots.
17	F	Not observed.	5 spots.
18	M	3 medium sized, foveated.	5 spots.

In all of these cases the re-vaccination was performed after the appearance of small-pox in the house or in the immediate neighbourhood ; that is after risk of infection had been incurred. Needless to say, all these cases recovered, none of them being confined to bed at any stage of the disease.

As a further means of showing the influence of vaccination upon the nature of attack, we may consider the number of abortive attacks in each class, the term abortive being here applied to those attacks (which were always discrete) where the eruption did not attain the pustular stage at least. In the majority of these abortive attacks the eruption simply became papular, and without any vesiculation taking place the papules died away.

Abortive Attacks (150 *cases considered.*)

Under 10 years of age.	Unvaccinated (See Note A) ...	4
	Once vaccinated	4
	Re-vaccinated	0
Over 10 years of age.	Unvaccinated	0
	Once vaccinated (See Note B)	24
	Re-vaccinated	9

Note A.—In three of these cases one was vaccinated on the 5th day of incubation, but the vaccination marks, beyond causing some slight irritation for a few days, did not apparently take. In another of these cases the vaccination was performed on the 9th day of incubation, but showed no external sign of having taken. In a third case vaccination was performed on the 8th day of incubation ; the marks became papular and then died away.

In all three of these cases it is conceivable that the vaccination had some effect in modifying the disease, although it showed no special local evidence of having taken.

Note B.—In one of these cases re-vaccination was performed on the 6th day of incubation, but gave no external sign of having been successful. The figures referring to attacks at ages over ten years of age are in favour of vaccination, and strongly in favour of re-vaccination, as agents modifying the severity of attack.

(*To be continued.*)

TUBERCULOSIS: A MENACE TO PUBLIC HEALTH.*

By Dr. WILLIAM BROWN, F.R.C.S.E., Medical Officer of Health, Carlisle.

IN an annual report on the health of Carlisle of a few years ago under the subject of tuberculous meat, I made the following observation :—"That there is real risk in eating the flesh of tubercular animals is unquestionable, but it is infinitesimal compared with the risks of partaking of milk derived from tubercular cows. On several occasions during my visits to the Public Slaughter-house I have seen the udders of cows affected with marked tubercular disease. In such cases the tubercular infection passes directly into the milk, and as this article of food is generally taken in the uncooked state, the danger of infection becomes very great. Until we in this country adopt the system of veterinary inspection of animals, such as exists in Denmark, milk infection will constitute the real danger of tuberculosis being transmitted from animals to human beings."

Further experience, gained by a systematic examination of the various parts of tubercular carcases at the Carlisle Public Slaughter-house, has afforded additional evidence of the truth of the opinion expressed in the foregoing statement as to

* Annual Report, 1897.

the risks of transmission of bovine tuberculosis to man from the ingestion of milk derived from udders affected with tubercular disease.

The life history of the specific micro-organism which during recent years has been found to be the cause of human and animal tuberculosis is now as thoroughly worked out, and perhaps even better than, that of the germ producing the well-known disease anthrax, so fatal to man and animals.

A tiny drop of anthrax blood taken from an animal dead of anthrax, when injected under the skin of an animal of the rodent class like the guinea pig, is followed almost invariably by the death of the animal in the course of twenty-four to forty-eight hours. A guinea pig treated in a similar manner with the tubercular virus dies almost equally surely, though the deadly process is slower, owing to the invading organism in the case of tubercle taking a longer time to accomplish its mortal effect.

The grave question of the possibility of an organism so destructive to human life as the tubercle microbe being present in milk obtained from a tubercular udder of the cow is no chimerical notion, but one which has received a positive and final answer by microscopical demonstration, and simple experimentation, of a harmless kind, upon healthy animals susceptible to tuberculosis.

The tubercular conditions met with in the carcases of bovine cattle at the Carlisle Public Slaughter-house are as follows, arranged irrespective of their order of frequency:—Tuberculosis of the lungs, and their covering the pleural membrane (consumption); the pericardium or heart bag; the bowels and their containing sac the peritoneum; the liver, spleen (melt), and pancreas (sweetbread); the kidneys, bladder, and uterus (womb); the brain and its membranes; the eye; the lymphatic glands of the body; the bones; the udder or milk gland. When we consider the tubercular conditions present in the human subject, we find that they are precisely the same in localisation or parts affected as come under observation in bovine tuberculosis, and every medical man engaged in general practice in Carlisle is confronted with most of the foregoing conditions among his patients in the course of a single year. In England lung tuberculosis or consumption is remarkably common, and tuberculosis of the brain and its membranes, an almost uniformly fatal disease, is of frequent occurrence. Tuberculosis of the lymphatic glands, the kidneys, bladder, bones, and joints form a large portion of the cases which present themselves for treatment at the Cumberland Infirmary and the Carlisle Public Dispensary.

The fatality from the disease in this country is deplorable. A micro-parasitic disease, like those of the zymotic class, it has a mortality in many English towns enormously greater than that from all the so-called zymotic diseases put together. In Carlisle the deaths from tuberculosis for the past three years have been considerably more than double the deaths from the principal zymotic diseases, including scarlet fever, measles, diphtheria, small-pox, whooping-cough, typhus fever, typhoid fever, continued fever, and diarrhœa.

The principal tubercular diseases, including lung tuberculosis (consumption), tuberculosis of the brain and its membranes, and tabes mesenterica (tuberculosis of the abdominal lymphatic glands, &c.), constitute 10·2 per cent. of the total number of deaths from all causes in Carlisle during the past ten years. Other English towns have a similar and even worse experience. Tabes mesenterica, or tuberculosis of the bowels and the lympathic glands interspersed between their coils, is a common cause of death and a still more common disease in Carlisle. It is a highly significant fact that these very two abdominal structures are the ones which first become tubercular when a guinea pig or rabbit is fed upon milk containing small pieces of crushed tubercle taken from a bovine source.

Perhaps there is no laboratory experiment upon animals so impressive from its overwhelming importance than the artificial production of tuberculosis in the abdominal lymphatic glands of a guinea pig or rabbit by feeding it upon bovine tubercle, or upon milk obtained in the ordinary way from the tubercular udder of a living cow. The death of the animal experimented upon usually takes place in from about six to eight weeks from the onset of infection, corresponding pretty much in point of time with the duration of some of the more rapid forms of human tuberculosis, such as acute tuberculosis of the brain and its membranes, and acute tuberculosis of the lung (galloping consumption). A *post-mortem* examination shows that though the coats of the bowels may or may not be visibly affected, the numerous lymphatic glands connected with the conveyance of the products of digestion from the bowels into the blood are, relatively to the size of the animal, enormously swollen from tubercular growth, in the substance of which the deadly tubercle micro-organism can be easily seen with the microscope, and its fatal specific properties tested upon various animals. Another point worthy of note with regard to the disease tabes mesenterica is the fact that it is the most common in young people under twelve years of age, or in other words, among those of the population who are the chief consumers of cows' milk.

Finally, medical science has fully established the fact that human tuberculosis and bovine tuberculosis are one and the same disease, produced by the same germ, and both easily transmitted to healthy animals, such as guinea pigs, rabbits, kittens, and young calves, by the ingestion of milk containing the specific tubercle microbe.

I am induced to bring this subject before the Health Committee at the present time owing to the increased number of tubercular milk glands which have come under observation at the Carlisle public slaughter-house during the past year. Thus, of the thirty cow carcases condemned for general tuberculosis as unfit for human food at the slaughter-house, one in every five had marked tubercular disease of the udder, some of which were in the stage of suppuration with foul smelling matter in their interior. A microscopic examination of portions of the udders subjected to this kind of investigation showed the tubercle germ in abundance.

In a few of the more advanced cases of tubercular udder disease, the milk ducts or channels for the conveyance of the milk secretion to the teats were very much dilated, and partially filled with soft tubercular growth projecting into their interior. A more favourable condition for the production of milk infection could hardly be conceived. I believe I am correct in stating that some of the cows with the tubercular milk glands had been milked until within a short period of their removal to the

slaughter-house. Moreover, the present time is a favourable one for taking action, as the public are now sufficiently educated on the subject of tuberculosis to appreciate the dangers that all classes of the community incur in consuming milk without any guarantee as to its being free from tubercular infection.

I beg to submit the following proposals :—(1) That all dairy cattle from which milk is derived for distribution in the Carlisle urban sanitary district be subjected to regular veterinary inspection ; (2) that a more rigid enforcement of the city bye-laws as to the cubic space of the Carlisle cowsheds be carried out ; (3) that, as an auxiliary measure, the Carlisle Urban District Council extend the provisions of the Infectious Diseases Notification Act to pulmonary phthisis, tubercular meningitis, and tabes mesenterica.

Tubercular disease of the udder in the living animal is, as a rule, easy of detection, and in a case of doubt the milk could be subjected to a microscopical examination with or without the administration of a dose of tuberculin to the animal to dislodge the germ from the milk gland. The general use of tuberculin for the detection of tuberculosis in milch cows is perhaps too advanced a measure to recommend in Carlisle at the present time, though it is systematically carried out in New York City and some parts of the Continent.

A liberal allowance of air space in cowsheds is important. Rearers of dairy cattle are well aware of the infectious nature of bovine tuberculosis and of its spread being very much favoured by overcrowding of animals in confined sheds. Reasoning by analogy from what is known of human tuberculosis we may fairly conclude that the spread of bovine tuberculosis is due apart from milk infection during the calf stage of existence to the presence of the specific microbe in the discharges from the lungs, bowels, bladder, and vagina of the affected animal. Hence the importance of adequate air space, free ventilation, and cleanliness.

Notification of the three principal tubercular diseases would lead to an inquiry as to the source of infection, and thereby put the Sanitary Authority in a position to take measures to limit the spread of the disease. In Berlin the disinfection of premises vacated by consumptive patients has been required by law for at least seven years, and a similar law has been enforced in New York City for four years.

THE PREVENTION OF DISEASE.

THE fifth of the series of Glasgow University Free Lectures was given on the 14th ult., in the Practice of Medicine Lecture-room, by Professor Sir W. T. Gairdner, his subject being "The Prevention of Disease." There was a large attendance.

Professor GAIRDNER said that when he was appointed to a Chair of the University in 1862, Scotland was very backward in all matters connected with public health as compared with England. The science of the prevention of disease was practically a thing of yesterday, and he instanced the disease of scurvy as one which people, including medical men, had been slow to learn anything of. The benefits of lemon juice as a preventive of scurvy were found out by sailors two centuries ago, but still the knowledge had not been acted upon. It was not till the close of last century that the lessons learnt regarding scurvy were brought home and acted upon in the practical manner that they knew of to-day. A great deal had been done by Lord Shaftesbury and other earnest men to spread a knowledge of the importance of the prevention of disease, and much stress was laid on the necessity for cleanliness everywhere. But the invention of the mode of expressing the death-rate of the towns and villages in the country by the late Dr. Farr, of London, was a service that might be called absolutely inestimable in the prevention of disease. Such calculations enabled reformers to see where the greatest number of deaths per 1000 of the population took place, and an investigation into the causes which led to the deaths was the result. It was seen that the death-rate was higher in proportion as the population was more aggregated than where humanity was more scantily spread. Sanitary reform was begun, and the results had been shown in a greatly decreased death-rate. In Glasgow alone since the passing of the Health Improvement Act in 1866 a saving of 10,000 lives in a year had been effected. After speaking of the tendency of the rural population to crowd into the towns, and, in a large majority of cases, to squat down in most unhealthy surroundings, he spoke of the large number of uninhabitable houses which existed in the city, in spite of the power of the Authorities, and went on to say that the Authorities must stick at nothing to do away with the sort of houses in which people could live under any conditions, and so bring about a purer atmosphere than was possible in many parts of Glasgow at present. Glasgow should be placed in such a position that it would be impossible for any person to own a house of that kind. The lecturer concluded by making an appeal for the establishment of a Chair in the University for the teaching of Public Health.

THE SANITAS COMPANY, LIMITED.

THE twenty-first annual general meeting of this company was held at the works, Bethnal Green, recently, under the presidency of the managing director, Mr. T. Kingzett, F.I.C., F.C.S., who congratulated the shareholders on the continued prosperity of the business. Attention was directed to a new preparation entitled "Sanitas Embrocation," which has been recently placed on the market, and to the purchase of the business of the American and Continental Sanitas Company, Limited, as a going concern. In consequence of this purchase the capital of the Sanitas Company, Limited, has been considerably increased during the past year, but the profits of the trading in 1897 were such as to allow of the usual dividend of $13\frac{3}{4}$ per cent. for the year, after making adequate provision for all charges, including depreciation of patents and goodwill account. The reserve fund of the company now amounts to upwards of 20 per cent. of its paid-up capital, and is invested in high-class securities. The main business of the company is that of the manufacture of disinfectants and sanitary preparations and appliances generally.

THE CONTAMINATION OF PUBLIC WATER SUPPLIES.

By FRANCIS SUTTON, Norfolk County Analyst.

REPORTS have been circulated in the newspapers as to sources of possible contamination to the water supply of this city (Norwich) at Drayton and other places along the course of the river from which the Norwich supply is taken. I am of opinion that facts as to the pollution of any public supply should be made known as widely as possible with a view to their prompt removal, but at the same time I think the public should know how these difficulties are successfully dealt with by properly managed water companies, so that practically no harm results.

The deplorable instances of Maidstone and Lynn are typical cases of gross neglect and carelessness with regard to the only thing which could have saved them from danger and death. In my position as a public analyst, I necessarily see and hear more of the anxiety, and even terror, of many people whose fears lead them to adopt measures involving far greater dangers than those they try to escape. An amusing instance occurred a short time ago in which a lady, having seen a statement in some paper that the drainage of a slaughter-house or some piggeries found its way into a watercourse connected with the river Wensum, made up her mind to give up drinking the city supply, and told me she had done so. I asked her what water she intended to drink. Oh! said she, there is a well on my premises which has been shut up for some time because it was said not to be good, but it looks quite clear, and I shall use that. I strongly dissuaded her from such a course, but the well water was analysed, with the discovery that it was of the most filthy description, and contained soakage from places infinitely worse than either slaughter-houses or piggeries, bad as they are. Some nervous people will insist upon filtering the water through a domestic filter, which they have been assured will render almost any water safe. Unless domestic filters are properly constructed and can be efficiently cleansed at very short intervals, they are a positive source of danger, besides which that kind of filtration renders the water stale and unpalatable.

I say with confidence that it is not necessary nor advisable to re-filter the water supplied by the Norwich company if taken direct from their mains. If collected in a cistern open to dust and other kinds of pollution the case may be altogether different. Any water supply derived from an open stream or broad surrounded by cultivated land, pasture, and here and there human dwellings or farm premises, must inevitably suffer more or less from contamination. The Thames in its long course receives an incalculable amount of noxious material, yet when its water is properly dealt with by the various London companies these evils are practically eliminated and destroyed. So far as I am aware, in spite of the inefficient way in which some of the water companies have at times dealt with it, and in spite of the enormous amount of pollution it has received at various points along its course, this London water has never been the cause of outbreaks of enteric fever or other diseases of the zymotic class, although the river itself at various points must have been heavily charged with disease germs and spores which originate such maladies.

What, then, is the protection? The organisms which propagate disease are infinitely small—so small that only the very highest powers of the best microscope can detect them, and their number and power of multiplication under certain circumstances is enormous; yet they have enemies arrayed against them vastly more numerous and powerful than themselves; and fortunately for us this war between microbes of one class and those of another is always going on.

Moreover, sunlight, ordinary daylight, and fresh air are deadly foes to those germs whose baleful influence we fear, but the greatest protection against them is slow, careful filtration through sand, copying by an artificial method the natural one of earth filtration, which gives protection to the waters of deep wells and springs. Of late years the action of these artificial filter beds is better understood than formerly, and we now know that these beds are the field of the most active warfare between the beneficent and the baleful microbes contained in surface water. The fight is somewhat of the same character as that described in the legend of the Kilkenny cats, where both antagonists are destroyed, or at least rendered *hors de combat*, for the eventful result is to deprive the water almost completely of microbes of every sort, the organisms themselves actually stopping their own passage through the filter.

Had this kind of filtration existed and been properly managed at Maidstone and Lynn, no such outbreak of typhoid as these towns have experienced could possibly have occurred.

REMOVAL OF MANURE.

SOME time since a circular communication from the Medical Officer of Health to the County Council was sent to the local Medical Officers of Health stating that the Public Health Committee of the Council, from time to time, receive complaints of nuisance arising from accumulations of manure at various premises in London; also that under Section 36 of the Public Health (London) Act, 1891, the Sanitary Authority is empowered to employ or contract with scavengers "for collecting and removing the manure and other refuse from any stables and cow-houses within their district, the occupiers of which signify their consent in writing to such removal."

In reference to this matter, the Medical Officer of Health, Kensington, states that "the Committee had been advised that the Sanitary Authority has no power to charge for this service, and they were considering the question whether, with a view to facilitating the removal of manure, it is desirable to seek an amendment of this section, so as to give each Sanitary Authority power to charge for the removal of manure, when required by the owner or occupier of any premises to remove it, similar to that which it now has under Section 33 in respect of trade refuse. The Medical Officer concluded by inquiring whether I was in favour of such a proposed amendment of the law. In reply to this communication I stated that in my reports, during many years, I had advocated not only that the Sanitary Authority should have power to remove

accumulations of manure in London districts, but also that in the interests of public health it should be made a statutory duty, and that they should be authorised to charge the owner of the refuse a reasonable sum for the service. As the law stands, the owner or occupier of any premises may 'require' the Sanitary Authority to remove any trade refuse on payment (Section 33), but the Sanitary Authority need only, 'if they think fit,' collect and remove 'manure and other refuse matter from any stables and cow-houses, the occupiers of which signify their consent in writing to such removal'—a consent which may be withdrawn or revoked with one month's previous notice to the Sanitary Authority (Section 36). The owner of such refuse cannot 'require' the Sanitary Authority to remove it; nor is he under any obligation to pay for the removal, although, doubtless, many occupiers of stables would be well pleased to do so, and so, on the one hand, be quit of a troublesome responsibility; and, on the other hand, be freed from liability to fine for neglect of your Vestry's regulations, which require the occupier to remove the refuse on Monday, Wednesday, and Friday, or on Tuesday, Thursday, and Saturday in each week."

It is a question, however, whether the refuse of a cow-house, or an omnibus or cab-yard, may not be classed as "trade refuse," which the occupier of the premises may "require" the Sanitary Authority to remove on payment; certainly fish offal, and the offal from slaughter-houses, comes under the definition of "trade refuse," and it is surprising that fishmongers and butchers do not "require" the Sanitary Authority to remove it.

In the interest of public health, the sooner this matter is put upon a proper basis the better, and we think that Dr. Dudfield is to be commended for bringing the matter to the front.

THE NEW SEWAGE WORKS AT MIDSOMER NORTON.

SOME particulars of these works, which have been recently opened, have been supplied by the engineer, Mr. W. F. Bird. From this description we gather that the process is that of precipitation by chemicals and filtration through artificial beds and land. The sewage on admission to the works passes first through a straining grating, where all coarse matters and foreign bodies are retained, and then through a scum and detritus chamber, which intercepts sand and fatty matters. Next the chemical precipitant (Ferozone) is added, the mixing being done by a "Kierby" machine, the motive power of which is a small water-wheel worked by a portion of the river water which has been diverted for that purpose. After the precipitant is added, the sewage is passed over a series of iron bafflers, which thoroughly mix the chemical with the sewage, and it then enters the first settling tank. This tank is 16ft. in diameter and 10ft. 6in. deep, and the sewage enters at the bottom by a series of vertical inlet pipes, and is discharged from the top by means of wood-collecting channels, and it is found that by this method all the solid matters in suspension are retained at the bottom of the tank. This is removed daily by means of an ingenious revolving steel arm, and is run on to prepared and drained sludge lagoons, where it is dried for removal, the thin liquid portion which is drained off being pumped back into the inlet chamber for re-treatment. After leaving this tank the sewage is run through another of similar design and size, and it is believed the present instance is the only one where duplication of tanks has been carried out, the engineer claiming that by means of it a better effluent is produced at a reduced consumption of chemicals. The tanks are so arranged that the sewage can be run through either of them separately, through both equally, or through one after the other. From the settling tanks the sewage effluent is now run on to the filter beds; these are four in number, each forty square yards in area, and are composed of gravel sand, and a patent filtering medium, known as "Magnetite." Either one or more of these beds can be used at the same time, and by an ingenious system of valves the effluent can be sent through any bed or beds and then brought up through any other bed, for the purpose of washing the top sand with the filtrant, and thus effecting a considerable saving of labour in sand washing. Leaving the works the filtrant is conveyed by a 12in. pipe for a distance of about 600 yards on to the outfall land, situated near Old Welton Colliery. Of this land about four acres has been laid out, channelled, levelled, and underdrained, and, after passing through this, the now purified sewage is discharged into the stream. The engineer for the works is Mr. W. F. Bird, C.E., Surveyor to the District Council; the engineer consulted to report upon Mr. Bird's scheme was Mr. T. S. McCullum, C.E., of Manchester; the contractors for the principal works are Messrs. Thomas and Webb, of Bristol, and for the outfall land works, Mr. W. A. Catley, of Midsomer Norton, and the clerk of works has been Mr. A. B. Carter. The patent sludge removal apparatus was supplied by Mr. Pullen-Candy, of Altrincham, the chemical mixer by Mr. Kierby, of Swinton, the "Magnetite" by the Magnetite Purification Company, of Manchester, and the ironwork and valves by the Glenfield Company, Limited. The cost of the works has been about £2100.

MICROBES AND SANITATION.

MR. F. W. RICHARDSON, the Bradford City Analyst, recently gave, under the auspices of the Bradford Health Association, a lecture on "Microbes and Sanitation." The lecturer, by means of lantern slides, elucidated the subject of the nature and distribution of germs. The principal zymotic and contagious diseases received full treatment, and the diminution of the death-rates was shown to be concomitant with improvements in sanitation. He described typhoid fever as "filth disease," one day to be blotted out through the final abolition of insanitary conditions. Sewer gas was undoubtedly responsible for the spread of typhoid, sometimes directly and in other cases by its potent action in reducing the vital resistibility of the organism. Bad plumbing in the way of defective drains and traps had very much to be responsible for, and the examination and registration of plumbers was a sign of real progress. Tubercular consumption was largely preventable, and the importance of preventing promiscuous expectoration on the part of consumptives was emphasised. The other chief infectious diseases were considered in brief, and the best methods of sanitary prevention were outlined.

Annotations from Annual Reports.

Precautions against the Pollution of Wells.—Reporting on the water supplies of the urban and rural sanitary districts of Taunton, Dr. Henry J. Alford, Medical Officer of Health, says :—"It should never be forgotten that the area drained by a well resembles an inverted cone, and the deeper the well the larger the area drained. The nature, too, of the soil is a most important factor, a sandy or gravel soil, of course, allowing of much easier percolation than a marl or clay. It is surprising how ignorant people continue to be of these simple facts. The situation of the well in relation to possible pollution seems, in many cases, to be entirely ignored. One instance came under observation of a well which it was maintained must be pure, as it was far away from drains in the middle of a garden. It was immediately under a heavily manured asparagus bed, which accounted for its pollution. Another not uncommon means of pollution is the habit amongst cottagers of emptying slops or waste water on the surface above the well, preparatory to cleansing utensils from the pump."

Contracts for Removal of House Refuse.—The drawbacks attaching to short contracts for removal of house refuse are commented upon in the report of Mr. C. W. Hill, Chief Sanitary Inspector, Carlisle. "In October last," he states, "the contract for the removal of refuse was let to a fresh contractor, but on account of having accepted a very low figure for the work, he has only undertaken to remove the refuse for one year, and consequently, next September fresh tenders will need to be procured. This is to be regretted, as changes of contractors at intervals has a tendency to somewhat interfere with the satisfactory collection of refuse owing to the employment of men and horses not accustomed to the work, which disadvantage would be entirely obviated, and a great general improvement effected if the work was undertaken by the Corporation themselves directly, employing their own men and horses."

Alcoholism in Leek Urban District.—The temperance party would evidently find scope for their energies in the Leek Urban District, judging by the report of Dr. J. J. Ritchie, Medical Officer of Health, who states that the deaths from alcoholism during 1897 were larger than he ever remembers seeing recorded in his returns. "Recent scientific observations," he adds, "have confirmed the belief long held by investigators that alcohol is inimical to health by reducing the resisting power of the tissues, and that in small quantities it actually assists in the multiplication and growth of many microbes, and that also in some diseases, at any rate, its administration is not only not followed by any good effect, but exerts a positively deleterious influence on the course of the disease, and nothing is more certain than that alcohol is responsible for a large proportion of the diseases of brain, heart, liver and kidneys observed, and this when taken in quantities far short of actual intoxication. The deaths from diseases of the organs named above are considerably in advance of those reported last year."

THE MUNICIPAL OFFICERS' ASSOCIATION.

LAST week we briefly recorded the fact that the fifth annual meeting of the members of this Association was held in the Council Chamber at Guildhall on Tuesday, the 22nd ult. There was a fair attendance of members. In the absence of the Lord Mayor, owing to indisposition, Mr. Alderman and Sheriff FRANK GREEN presided. In opening the proceedings he extended a cordial welcome to the members. The fact that the present was the fifth annual meeting of their Association indicated, the Alderman continued, that the Institution was one whose objects must, if attained, be of benefit. The Alderman then vacated the chair, a vote of thanks being afterwards accorded to him. Mr. C. WILLIAM TAGG, Vestry Clerk of Camberwell, was then elected to the chair, and moved the adoption of the report, which stated that the past year had been one of great progress, the Association having not only maintained its position, but trebled its membership since the previous report was issued. The Association, the report continued, was now in a position, so long desired, to further develope the aims and objects for which it was formed. The report went on to speak of the question of superannuation, and urged that that matter should be pushed forward as much as possible. The report was adopted.

Mr. JONES, in proposing the Lord Mayor for the post of president, said that their Association, ever since its foundation had been taken, so to speak, under the ægis of what was the greatest Municipal Authority of the world. The Association had a great responsibility cast upon it, and it was essential, therefore, that they should leave no stone unturned to keep it up to a high level. It was manifestly of immense importance to have someone like the Lord Mayor of London at their head, because he represented practically the highest level of municipal life.

The Lord Mayor having been unanimously elected, the following members of the Association were re-elected as vice-presidents :—Mr. G. S. Ager, chairman, M.R.C.A.; Mr. G. Attenborough, accountant, S.B.L.; Sir A. R. Binnie, chief engineer, L.C.C.; Mr. Samuel Brown, town clerk, Salford ; Mr. F. Cooke, town clerk, Crewe ; Mr. G. H. Croad ; Mr. H. H. Crawford, city solicitor ; Mr. John Price, city surveyor, Birmingham ; Mr. H. M. Robinson, LL.D., vestry clerk, Shoreditch ; Mr. A. W. J. Russell, chairman, executive council, 1895—96 ; Mr. S. Southall, town clerk, Worcester ; Mr. C. J. Stewart, clerk to L.C.C.; Mr. M. H. Hale, vestry clerk, Holborn District Board ; Sir Samuel Johnson, town clerk, Nottingham ; Mr. Shirley F. Murphy, Medical Officer of Health, L.C.C.; Mr. C. William Tagg, vestry clerk, Camberwell ; Mr. J. Wilson, clerk, Croydon Rural District Council. Mr. Gilbert Harnden was elected the hon. treasurer, Mr. C. J. F. Carnell, the hon. secretary, and Mr. W. Gunner (Croydon), and Mr. J. R. Thwaites (St. Martin's-in-the-Fields) the auditors. The following re-elections also took place :—Standing parliamentary counsel, Mr. G. A. R. Fitz-Gerald ; counsel, Mr. A. Macmorran, Q.C.; junior counsel, Mr. H. Courthorpe-Munroe ; hon. solicitor, Mr. Matthew H. Hale.

The Lord Mayor being absent, the usual presi-

dential address was not delivered. The CHAIRMAN, however, in a lengthy address, referred to the question of superannuation, and moved the following resolutions :—"That this Association respectfully desires to draw the attention of the Government to the hardships experienced by officials of Local Authorities in the metropolis on account of the permissive nature of the Superannuation Act, 1866, inasmuch as in several recent instances, officials who had after long and faithful services been compelled by infirmity of mind or body to resign office were refused a retiring allowance without any reason for such refusal being assigned, while in the case of other officials substantial allowances were granted ;" and "That the Government be earnestly urged to insert in any Bill now before, or to be introduced into Parliament with reference to local government, a clause providing for uniformity of action by the Local Authorities throughout the country, and making compulsory the granting of retiring allowances (except in cases of dismissal from office for official misconduct) upon the officers contributing a percentage deduction from their salaries." The resolutions were carried, and the election of members of the executive council brought the proceedings to a close.

EDINBURGH SANITARY PROTECTION ASSOCIATION.

THE twenty-first annual meeting of the Edinburgh Sanitary Protection Association was held in Dowell's Rooms, Edinburgh, Sir Douglas Maclagan presiding. The annual report, which was submitted by Colonel Noble, the secretary, stated the Society, during the twenty-one years it had been in existence, had done a great deal of inspection work in both town and country. The balance at the credit of the Society was £3028 2s. 2d. The chairman moved the adoption of the report, and remarked that the Society had always been a philanthropic and not a commercial institution. Mr. J. R. Findlay seconded the motion, which was adopted. In moving a vote of thanks to the chairman, Sheriff Mackay alluded to his eminent services in the cause of the public health, and mentioned that the past year had been an important one in this direction, in that arrangements were being made for the institution of a Chair of Public Health in Edinburgh University, while there had been passed by Parliament the new Public Health (Scotland) Act.

SANITARY HOTELS AT HOLIDAY RESORTS.

CO-OPERATION OF READERS REQUESTED

IN accordance with an announcement made in previous issues of THE SANITARY RECORD, we are prepared to examine and report upon the sanitary condition of Hotels and Boarding Houses at Holiday Resorts, and if the examination is satisfactory, to issue a certificate to that effect. Sanitary Inspectors and others are invited to co-operate with us in this matter, and we shall be pleased to forward particulars to any such who may care to do so. We are not asking for gratuitous assistance, but are prepared to adequately recompense sanitary workers who may interest themselves in our enterprise.

SANITARY HOTELS.

ILFRACOMBE. — Ilfracombe Hotel, H. R. Grover, Manager.

General News.

HOME.

NOTICE.—On and after 31st March next the Annual Subscription to this Journal will be raised to 12s. 6d. to all NEW Subscribers. NO ADVANCE will be made to our friends whose names are entered on our Subcription list prior to that date, so long as they continue to Subscribe.

SWINDON.—It has been decided to erect new baths at a cost of over £5000.

ROMFORD.—The Urban Council has resolved to invite competitive plans for the erection of public baths that are not to cost more than £4000.

NOTTINGHAM.— Mrs. Longshore-Potts, who, it will be remembered, lectured with much success in Nottingham two years ago, commenced a series of five afternoon lectures on women's health on Monday, February 28th.

RYTON.—Owing to an epidemic of measles which is prevailing in the district, several of the schools have been closed for the present, on order of the District Council. The schools in the meantime are being throughly disinfected by the Inspectors.

CUCKFIELD.—The Rural District Council has resolved to apply to the Local Government Board for a loan of £60,000 for the purchase of the Mid-Sussex waterworks, together with the necessary expenditure for the proposed extension of the works.

LLANDUDNO. — A Local Government Board inquiry has been held into three applications by the Urban District Council for powers to borrow £8634 for water supply works, £3580 for gasworks purposes, and £1395 for a site for workmen's dwellings.

LEEDS.—The Corporation Baths Committee, at a recent meeting, decided to recommend the City Council to apply for powers to borrow £23,000 for the purchase and renovation of the Oriental Baths, Cookridge-street, now the property of a private company.

EASTBOURNE.—A Local Government Board inquiry has been held as to a petition for a Provisional Order by the Corporation, empowering the Council to apply the Lands Clauses Acts with respect to the purchase and taking of lands otherwise than by agreement, which are required by the Corporation for the extension of the borough hospital, and for purposes of street improvements.

STIRLING.—A public meeting was held recently in Stirling for the purpose of inquiring into the sanitary condition of the town, with special reference to the epidemic of scarlet fever, which has been prevalent for some time past, but which is now subsiding. During the course of a lengthy discussion, a number of questions regarding the health of the burgh were put and partially discussed, but as it was deemed advisable they should get more particular attention, and the Local Authority given an opportunity of answering them with authority, it was agreed that a deputation of ten gentlemen be appointed to wait on the Public Health Committee of the Town Council and lay the matters before them.

WINSFORD.—At a recent meeting of the Urban District Council it was reported that there was a serious outbreak of measles in the town. Over 100 children were absent from the Board School through the prevalence of the disease. The Medical Officer of Health pointed out that prompt action was necessary, and the Council decided to close the school for three weeks and take other necessary steps to prevent the spread of the disease.

MANSFIELD.—At a monthly meeting of the Town Council it was decided to lay new water-mains at a cost of £270, and to extend a sewer at a cost of £100. As the enlargement of the swimming bath would cost £750, it was decided to postpone the question for the present. It was resolved to lend £3000 to the Mansfield Woodhouse Urban District Council at 3 per cent., for the purpose of carrying out the works of water supply.

HEANOR.—For some time past the Council has been somewhat perplexed in regard to the water scheme which it started last midsummer at Smalley. It appears that owing to some misunderstanding with the owner of the land, Mr. R. S. W. Sitwell, the operations at the works ceased. It was explained at a recent meeting that Mr. Sitwell required £600 to be deposited with the Belper District Council as security in payment of costs for laying mains, in accordance with an agreement made by Heanor Council in October, 1896. After some discussion it was resolved that the sum of £600 should be deposited with Belper Authority; also that the purchase of the land should be completed on those terms.

CARDIFF.—At a recent meeting of the Health Committee of the Corporation, the borough engineer, Mr. W. Harpur, presented plans for the extension of the sanatorium. The plans provided for the erection of three pavilions, similar to the present structures, and there will be accommodation for sixty extra beds. The cost is estimated at £24,000. In reply to questions, Dr. Walford, the Medical Officer, stated that there would be no extra provision for isolation, but if the new buildings were erected the whole of the present isolation hospital could be used, and this would be ample. At present there were seventy-two beds, and the new pavilions would contain another sixty beds. The plans were inspected, and afterwards passed, and the Committee is now in a position to apply for a loan for the required sum.

BATTLE.—At the last meeting of the Urban Council the Water Committee reported that on account of the exceptionally dry winter and the non-breaking of the springs, the old well had given out and they had to trench upon the resources of the new well. They had therefore found it absolutely necessary to issue notices to consumers asking them to exercise every care to prevent waste. The chairman said it was a most serious matter, and if the Council had been free from loans, he should advocate going at once for a good additional supply. This was the second year of drought, and the want of water was being felt almost everywhere. Their present supply was not artesian, but simply by percolation. He did not think they ought to allow the question to remain in abeyance till they were forced to take action. He would be pleased to make a survey with some of the members, with the object of finding an additional supply.

ABROAD.

JOHANNESBURG. — The Town Council has selected a site for proposed destructor. The area is 3½ acres and the price fixed is £25,000. The matter has to be confirmed by public meeting which is to be held during this month.

RICHMOND (N.S.W.)—The analysis of water taken from the Richmond water supply reveals an unsatisfactory state of things. The Board of Health recommends, among other things, the filtration of the water before it enters the reservoir. A special meeting of the Municipal Council has been called to deal with the matter.

ASHFIELD (N.S.W.)—Typhoid is still very prevalent in the borough of Ashfield. The Council has just completed the construction of the drain across the Parramatta-road, through Dobroyde. This will afford an escape for the accumulation of what was formerly little better than a swamp, and a serious menace to the residents of the locality.

Personal.

MR. CRAYTHORNE has been reappointed Sanitary Inspector for the district of Paignton.

MR. M. GEPP has been appointed Medical Officer of Health for the borough of Shrewsbury.

Mr. G. R. GREEN has been appointed Medical Officer of Health for the borough of Ripon.

MR. S. ANDREWS has been appointed Medical Officer of No. 2 district of Basingstoke union.

MR. J. F. HOLDEN has been appointed Medical Officer for the fourth district of Preston union.

MR. T. G. DICKSON has been appointed Medical Officer of Health for the rural district of Hay.

MR. J. T. JONES has been appointed Medical Officer of Health for the rural district of Llansilin.

MR. P. H. NUTTING has been appointed Medical Officer for the third district of Malmesbury union.

MR. J. H. PEET has been appointed Medical Officer for the No. 8 district of Basingstoke union.

MR. C. B. TRUMPER has been appointed Medical Officer of Health for the urban district of Market Rasen.

MR. T. G. DICKSON has been appointed Medical Officer of Health for the rural district of Painscastle.

MR. A. ST. L. BURKE has been appointed Medical Officer for the Bushbury district of Cannock union.

MR. T. G. DICKSON has been appointed Medical Officer of Health for the rural district of Bredwardine.

THE salary of Dr. Monk, Medical Officer for Leicester, has been increased from £500 to £600 per annum.

MR. J. P. WAKEFORD, A.M.I.C.E., M.S.I., assistant for the past five years in the office of the city surveyor and waterworks engineer, Dublin, and formerly assistant in the office of the city engineer of Belfast, has been appointed assistant waterworks engineer to the Corporation of Harrogate.

MR. H. L. THURRELL has been appointed Medical Officer of Health for the borough of Gravesend.

MR. H. M. WISE has been appointed Medical Officer of Health for the Plumstead district of Woolwich union.

MR. E. T. PRIOR, of Loddon, has been re-appointed Medical Officer of Health for the rural district of Loddon and Clavering.

MR. J. T. GRIFFIN has been appointed Inspector of Nuisances, and Mr. S. J. Taylor, Medical Officer of Health for the urban district of Chingford.

THE Battersea Vestry has decided to increase the salary of Miss Bertha Thurgood, Sanitary Inspector, to £101 per annum, rising to £150 per annum.

MR. J. S. HIGHFIELD, of Stafford, has been appointed resident Electrical Engineer for the St. Helens Corporation, at a salary of £200 per annum.

THE Local Government Board has sanctioned the reappointment of Dr. Sanderson as Medical Officer of Health for Hastings, at the reduced salary of £20 per annum, on account of the smaller area.

MR. JAMES SAUNDERS, assistant Surveyor of Oldham, has been elected City Surveyor and Water Engineer of Chichester. Mr. Saunders is a graduate of the Incorporated Association of Municipal and County Engineers, an Associate of the Royal Institute of British Architects, and an Associate of the Manchester Society of Architects, and he has had considerable experience in carrying out the large engineering and architectural works recently constructed by the Oldham Corporation.

Sewerage Schemes.

[TO MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

THE plans of the Saxmundham drainage scheme have been sent to the Local Government Board.

THE new contract for laying a sewer along foot of Garden-road to West Port, Newburgh, has been commenced by Mr. William Barlow.

NOTIFICATION of objection to the Glasgow Corporation (Sewage, &c.) Bill has been lodged in the House of Commons on behalf of the Commissioners of Clydebank.

A LOCAL Government Board inquiry has been held at Hurstpierpoint in respect to a petition presented by the Council to the Local Government Board, asking it to empower the Council to put in force, with reference to certain lands required by it for the purpose of the disposal of the sewage of the parishes of Hurstpierpoint, Keymer, and Clayton, the powers of the Land Clauses Acts, with respect to the purchase and taking of lands otherwise than by agreement.

A LOCAL Government Board inquiry has been held at Tingley relative to an application of the Ardsley East and West Urban District Council for sanction to borrow £2900 for sewerage works.

THE Tutbury Rural D istrict Council has instructed Mr. J. E. Willcox, C.E., of Birmingham, to prepare a scheme for the sewerage and sewage disposal of the parish of Branstone, within the district of the Council.

THE Local Government Board has sanctioned a loan of £4500 for works of sewerage and sewage disposal at Aldridge, and at a recent meeting of the Walsall Rural District Council Mr. J. E. Willcox, C.E., of Birmingham, was instructed to at once proceed with the scheme.

A LETTER has been received from the Local Government Board with respect to the application of the Portishead District Council for sanction to borrow an additional sum of £3000 for works of sewage, and requesting that the Board should be supplied with additional particulars from the Council respecting the same.

THE question of the Clewer drainage scheme was brought forward at the last fortnightly meeting of the Windsor Rural District Council. The Local Government Board propose to hold, on March 15th, an inquiry into the matter of obtaining by compulsory powers a piece of land at Clewer for the purpose of erecting a pumping station.

AT the last meeting of the Stonehaven Police Commission, a recommendation from the Finance Committee, to the effect that the Commission borrow from the Town and County Bank the sum of £1400 in connection with the water and sewerage operations in the Slug-road, and £1650 in connection with the lodging-house, was agreed to.

A SPECIAL meeting of the Keith Burgh Commissioners was held recently for the purpose of considering Dr. Aitken's report on the waste products of the distilleries and public works within the burgh. The report was read by the chairman, and all the details were then carefully considered. After some discussion, it was agreed to admit into the proposed sewerage scheme the waste products from these works under certain conditions, these conditions to be afterwards specified and submitted to the owners for approval.

AT a recent meeting of the Wishaw Commissioners an exhaustive report, prepared by the burgh engineer (Mr. Tait) on the diversion of the outlet drain at Craigneuk, owing to the Lanarkshire Steel Works extension, and on the present condition of the sewerage when it enters the river Clyde at one point, and Calder water at the other, was rejected. The outlet to be disused was about 25ft. deep, and was put in twenty years ago. The report proposed diverting the outlet to a junction with the main outlet near Carbarns, two miles distant, the cost being £2050. The report was favourably received.

THE names of the Royal Commission on the unsavoury but important subject of sewage disposal in the large towns will shortly be stated to Parliament. It will be a Committee mainly of experts on hygiene and the disposal of sewage.—*Daily News.*

AT a recent meeting of the Isle of Thanet Rural District Council, Mr. E. Bailey-Denton's report for estimate for sewerage and sewage disposal of Minster was submitted for consideration. The report dealt exhaustively with the proposed scheme, which provides for the requirements of a population of at least double the present population of the area dealt with. The report and estimate having been considered, it was decided that the District Council should meet, and that the Minster Parish Council be invited to join them to inspect the whole area to be drained. It was also decided to ask Mr. Bailey-Denton to be present and give any information required.

A SPECIAL meeting of St. Andrews Town Council was held last week for the purpose of considering the question of drainage outlets. The clerk (Mr. Grace) read a long report on the subject prepared by Mr. W. P. Brenan, Oban, which had been provisionally approved by a committee having charge of the matter. In the report, Mr. Brenan proposed the construction of a 371ft. iron sewer at a cost of £442; a sedimentary tank to be placed at the seashore, £1438; pumping station, with single engine and pump pipes and well, £266; gravitation sewer from Rathelpie to City-road, £386; engineering and contingencies, £254; making a total of £2786.

THE Committee of the Manx Legislature appointed in the matter of the application by the Douglas Corporation for power to borrow £20,000, in addition to £35,000 already authorised for the improvement of Douglas sewerage, sat on Wednesday, the 23rd ult. The application was opposed by a number of ratepayers, who objected to the mechanical system proposed. Mr. E. H. Stevenson, engineer, London, the designer of the scheme, stated that the only reason that existed for the mechanical system was that certain basements were below the tidal level. If these were not to be drained a gravitation system would be better and cheaper. The inquiry was adjourned to allow a gravitation scheme to be submitted.

FOR some months past the condition of the drainage at the Islington Parochial Schools has engaged the earnest attention of the Guardians, and on more than one occasion members of the School Committee have asserted most positively that the drainage is perfect. A slight outbreak of enteric fever among the children has led to an exhaustive inquiry being made, with the result that one of the latrines was found to be not only in a defective condition, but to have no outlet at all. It had also been rumoured in some quarters that an old sewer runs directly under the school buildings. Notwithstanding all that has been said upon the question of the drainage of the schools, experts are at present unable to state that it is in absolutely sanitary condition.

Lighting.

THE Belfast Corporation has decided that the extension of the lighting of the Knock and Sydenham districts be proceeded with without further delay.

AT a recent meeting of the Lancaster Town Council it was resolved to apply for powers to borrow £10,000 to increase the electricity plant so as to double the output.

THE Corporation of Aberystwith has notified its intention of opposing the Gas Bill by counsel when the Committee stage is reached in the House of Lords.

THE Electric Light Committee of the Dublin Corporation has decided to advertise for tenders in connection with the laying of the new cables for the electric lighting of the city.

AT a recent meeting of the Drogheda Corporation a resolution was passed approving of the action of the Gas Committee in arriving at an agreement with the Gas Company to purchase the works at £21,000.

THE Loughborough Town Council has decided to appoint a committee to report on the advisability of taking steps to acquire the gas undertaking, and also to obtain information and report on the question of establishing electric light in the borough.

THE Electric Lighting Committee of the Greenock Council reports that the probable cost of lighting the burgh would be, roughly, £95,000. The report also indicates that the most suitable place for the installation would be the Water Trust property at Prospect-hill.

AT a special meeting of the Sheffield City Council last week the matter of the purchase of the undertaking of the Sheffield Electric Light and Power Company by them came up for consideration. At the meeting on the 9th ult., the terms of purchase as submitted by the company were agreed to, but it was done in such a way that a day or two after a letter was received from their solicitor saying that the directors had decided to suspend the negotiations for the sale for the present. Thereupon the Parliamentary Committee met, and passed a resolution expressing regret that the negotiations had been suspended, and fully acquitting the directors of any improper secrecy or conduct in the matter. The reply from the solicitor to the company was to the effect that if the Council endorsed the apology of the Committee, the negotiations would be allowed to proceed. The terms of purchase are that the Corporation shall pay for every £100 of capital properly expended £220 in 2½ per cent. redeemable stock, or £213 8s. in cash.

LARGE new condensers and scrubbers have just been erected at the Pitlochry Gas Works by Messrs. Balfour and Co., Ltd, Leven, and were put in use for the first time last week, when they were found to work very satisfactorily. It is understood that considerable extensions are to be made to the works this year, owing to the rapid increase in the consumption of gas.

THE Electric Lighting Committee of Edinburgh Town Council recommends the laying of a new feeder from Dewar-place along Grove-street, and out to Merchiston, at a probable cost of £1400. On the recommendation of the same Committee, the Council has agreed to accept an offer of £1100 from William Clowes and Sons, London, for the purchase of two engines and dynamos at the central electric lighting station, for the use in which they had become too small.

THE Town Council of Stirling having some time ago requested Professor Kennedy to report further as to the practicability of utilising the water power at Touch for the electric lighting of the town, his report was submitted to a recent meeting of the Council. He finds that the maximum theoretical hydraulic horse-power of the water coming into Stirling from No. 3 reservoir is 26; from No. 4 reservoir, 7; and from the Touch compensation water, 7—in all, 40 theoretical hydraulic horse-power. The actual amount of this horse-power in the mains at Stirling for supplying light would not be more than half of this amount, however, and it might be considerably less. The total horse-power provided in his steam-power estimates was 320, which would, after making all allowances, deliver at least 233 electrical horse-power at the lamps. The total cost of this plant would be between £8000 and £8500.

THE Tramways Committee of the Liverpool City Council recently had under discussion a scheme formulated by Mr. Holmes, city electrical engineer, for the construction of two generating stations to supply the whole city with electrical energy for lighting, tramways, and power purposes. Dr. Hopkinson, the consulting electrical engineer, approves of Mr. Holmes's proposal of combined stations for generating, anticipating 5 per cent. saving in cost of plant, although no great economy in coal and wages. There would be an advantage in the reserve machinery being available for either services. The Lighting Committee and the Tramways Construction Committee, who have considered the scheme, recommend that the existing electric lighting stations remain under the control of the Lighting Committee, and that the power stations to be hereafter provided be managed by a special committee to be appointed, and including eight members of the Lighting Committee, and eight of the Tramways Committee, and that the erection of additional generating stations be considered by the joint special committee. If thought convenient, new borrowing powers will be applied for to raise money to erect two new generating stations at an early date, Pumpfields being suggested as a suitable site for the first station.

THE Holborn Guardians have passed a resolution protesting against the proposed increase in the price of gas by the Gas Light and Coke Company, and requesting the Guardians of other unions and parishes situate in the area supplied by the company to join in the protest.

COVENTRY is taking to the electric light with increasing kindness. The annual report of the Corporation's Electric Light Department shows that the number of consumers increased during the year 1897 from 72 to 100, and the lamps connected from 5662 (8 c.p.) to 8149. Further connections are being made.

Sanitary Inspectors' Associations.

CARNARVONSHIRE.

ON Saturday, the 19th February, at the Guildhall, Conway, a conference of this society was held, Dr. Fraser, Medical Officer of Health for the county, in the chair. The Association resolved to amalgamate with the North-Western and Midland Association. The annual balance sheet, which was considered very satisfactory, was read and adopted. Officers were elected as follows:—Dr. Fraser, president; Mr. E. Worrall, Penmaenwawr, chairman of council; Mr. J. P. Davies, Carnarvon, honorary secretary. The morning meeting closed with a vote of thanks to Dr. Fraser for his valuable services to the society, moved by Dr. Prichard and seconded by Mr. J. Jones, Conway. At the afternoon sitting, Dr. G. Read, Medical Officer of Health for Staffordshire, gave a lecture on "The Principles of House Drainage," the lecture being illustrated by numerous diagrams and models.

Houses Let in Lodgings.—Mr. William Kelso, Chief Sanitary Inspector, Paisley, alludes in his report to the difficulties which attach to this branch of his work. People occupying small houses hardly sufficient for their own requirements—in many cases insufficient—take in lodgers. The common excuse is "that they are friends and are not payng as lodgers." In other cases a room or two is let "to make a little money." Such cases could be dealt with under Section 16 of the Public Health Act, but the procedure is not only cumbersome, but fails in effect. A much more simple summary and effective procedure is to register such houses as "houses let in lodgings," which, it must be observed, extends to "houses occupied by members of more than one family." This brings them under regulations which can easily be enforced, if properly understood and appreciated. In Paisley thirty-five such houses were registered during the year, and twenty-seven of these were over-crowded by from one to five adults. The total number on the register at the end of the year was eighty-one, and twenty-seven of these remained overcrowded, notwithstanding the efforts of the Inspectors. Although proceedings were taken against two of the worst offenders, who were convicted and fined in sums of 2s. 6d. and 5s. repectively, this was evidently looked upon so lightly that it had no deterrent effect on the others.

THE RENOVATION OF BOMBAY.

WE abstract the following interesting particulars from an important article which appeared in *The Engineer* for February 25th :—

On previous occasions we have announced to our readers the steps taken in the movement on foot for the improvement of the city of Bombay, and the proposals of the Government in this matter. We are now in possession of the draft of the Bill before the Legislative Council of the Presidency which embodies these objects, and the new Act entitled "The City of Bombay Improvement Bill, 1898," has probably by this time become law. There is no city in India, and probably there are few in the Empire, in which the population is so densely packed as in Bombay, and the overcrowding, both by buildings and of the residents in them, is a standing menace to health. As long ago as 1864, Dr. A. H. Leith, a pioneer in sanitation, and Health Officer of the island, recommended that advantage should be taken of the health-giving sea breezes to ventilate the town by opening up broad avenues through the dangerously overcrowded localities running from the sea-shore on the west towards the east.

Again, in 1887, a committee reported that a series of roads were necessary so that the town and island might be traversed by the prevailing winds with the least possible interruption. But little then could be done where the evil is most serious, except in the way of occasional "set-backs," owing to the ban placed on the action of the Corporation through financial considerations. Of late the evil of overcrowding has become intensified, and from 30 to 40 per cent. of the population is concentrated in areas forming only 3 or 4 per cent. of the area of the island, the density of population being in places even more than three times that of the most crowded areas in London, and over large sections the ground area is under ten square yards per individual. It is not to be wondered at that in these circumstances the total mortality, which for the whole city averages 40·71 per mille, is reported to have reached in the crowded localities a rate per mille varying from 52·15 to 68·09.

This was in 1896, just before the bubonic plague had developed itself as an epidemic. As soon, however, as the plague assumed this character, the necessity of action became accentuated, for the heavy mortality soon reacted disastrously on trade and commerce. It was found that the chief condition influencing the occurrence and spread of the scourge in certain localities, was defective ventilation and density of population. Overcrowding made inspection, the detection of cases, and the proper application of sanitary remedies impossible. Searching investigation into the sanitary conditions, which followed, brought prominently into notice a very large number of dwellings which, besides being dangerously overcrowded, were highly insanitary, being defective in ventilation and so shut in as to be deprived of light and air that they were in many cases wholly unfit for human habitation.

With a view to remedying effectually these conditions, the Bill provides for the improvement of the city by forming new, and modifying existing streets, by removing or altering insanitary buildings, by providing open spaces for better ventilation and for recreation, and by constructing new sanitary dwellings for certain classes of the inhabitants of the city, and quarters for the Presidency police, who now find proper accommodation impossible of attainment. It is found, moreover, that it will be possible by suitably aligning the new streets, so urgently necessary for the improved ventilation of the city, to take up a large proportion of the insanitary dwellings as either part of the street or as frontage lands abutting thereon.

These projects for improvement and purification of densely-crowded localities will, as a matter of necessity, displace a considerable portion of the population, and to provide for this it is intended to fill in and lay out by constructing roads, &c., extensive tracts of vacant land to the north of the city, and to provide thereon, either through the proposed Trust or by private agency, or both, improved dwellings. These vacant lands are scheduled in the Bill, and are situated in the vicinity of the lines of existing or proposed railways, and can be served by extensions of the tramways so as to possess easy means of communication with business and industrial centres.

During the last twenty-five years a very large area of land in the aggregate has been built upon, and there has been an enormous development in the provision of dwellings of a superior class. This activity still continues, and it is remarkable that in many instances costly residences have been erected on restricted and unsuitable if not insanitary sites. The Government therefore propose to hand over certain vacant lands—scheduled in the Bill—their property and suitable for the purpose ; and the Bill accordingly makes provision for the expansion of the city by acquiring and laying out vacant lands, and reclaiming and laying out parts of the foreshore of the island. These portions of the foreshore on the west side of Colaba and Walkeshwar can be reclaimed at no great cost, owing to the natural level being considerably above low-water mark.

The sites thus made available will be well adapted for residential purposes, and will extend over long reaches of sea front with a westerly aspect, those at Colaba being near the business centres, and those at Walkeshwar no further away than the sites recently taken up in such numbers in the same locality. The experience of the Port Trustees has shown that reclamations in such circumstances can be effected at remunerative cost ; that sites made available on such reclamations, when properly laid out, command a ready market, and are profitable for the investment of capital in building.

The duty of carrying out the provisions of the Act is, as we have stated previously, to be vested in a Board of Trustees. This Board is to consist of thirteen members—three *ex-officio*, six elective, and three nominee trustees, with a chairman appointed by the Government. The Bill, after the first two or preliminary sections, is occupied with the constitution, salaries, duties, and powers of the Board. We shall shortly notice some of these matters.

The course of action with regard to the Improvement and Reclamation schemes is similar. On the Board being satisfied by official representation of the unhealthiness of a district or area, it may make a scheme for its improvement. This official representation embraces a wide range of interests ; either the Government itself or the Corporation of the City, through the Commissioner

— presumably the Municipal Commissioner — or even directly by the taxpayers themselves.

The scheme, when duly prepared with accompaniments in the shape of plans and estimates, and after due public notification, is to be submitted to Government for sanction with certain accompaniments. When sanctioned, a declaration under the signature of the Secretary to Government is to be published in the Government *Gazette*, after which the Board may proceed with the execution of the scheme. The interests of the public in the matter of construction by the Board are placed under the guardianship of the Municipal Commissioner, and it is decreed that the streets for carriage traffic are not to be less than 40ft., or if for foot traffic not less than 10ft.

THE VACCINE LABORATORIES OF GERMANY.

THE vaccine laboratories of Germany are under Government control. The percentage of successful vaccination in Berlin is 96·84; in Hamburg, 94·85. The best laboratory in buildings and equipments is that of Cologne. At Hamburg vaccination of 1700 primaries with "germ-free" lymph gave eight cases of skin eruptions. The Imperial Berlin Commission recently reported that, in its judgment, inflammatory appearances are due (1) to the condition of the person vaccinated; (2) to the greater or less amount of effective lymph in the material applied; and (3) to the technic employed in the inoculation. The Commission stated that inflammatory complications are especially frequent if the incisions made in the inoculation are numerous, long, deep, and close together.

It is a familiar fact that inflammation is more frequent in secondary than in primary vaccination. It is also unfortunately the case that a number of German reports state that quite enough disinfection of the arm by means of sublimate solution and ether before vaccination does not prevent all inflammatory complications, but in some cases has actually seemed to increase them. Nevertheless it has been a great advantage to vaccine production that practically "germ-free" lymph may be obtained; because the germs present, while as a rule non-poisonous, are, it is thought, injurious to the vaccine organism, and it is a fact that by employing "germ-free" lymph the so-called "purulence" in the producing animals, one of the former bugbears of the vaccine laboratory, has practically disappeared.

Laboratory workers have about come to the conclusion that it is at present impracticable to produce a sterile vaccine, but two different and partially effective methods of bringing down the number of germs have been discovered. One method consists of centrifugalisation of virus which has been diluted with water; and the second, of mixing the virus with varying proportions of glycerin. The former method reduces the number of bacteria present, but does not entirely remove them; the latter is much more effective, and by means of it the number of germs in lymph, as tested by making cultures on agar, can always be materially reduced within a period which varies from a few days to a few weeks. Sometimes this does not secure sterility, but when old glycerinated virus is not sterile the inference simply is that the germs present are such as resist the action of glycerin; the bacillus subtilis, for instance, which is non-pathogenic, is unaffected by glycerin.

It may then be fairly stated that lymph practically, although not absolutely "germ free," can be secured with considerable certainty. The results from the use of this so-called "germ free" lymph, whether absolutely sterile, have not, however, secured freedom from the inflammatory complications of vaccine. On the contrary, it is the general testimony given by those who have experimented at length with such lymph that inflammatory reactions occur in about the same proportion of cases as before this lymph was introduced, and also that not merely inflammatory complications are present, but occasionally vaccinal eruptions as well, as has already been stated above regarding the Hamburg experiments. Finally, it should be added that while every brand of vaccine has its own bacterial flora, the few germs which are common to almost all are very clearly non-pathogenic to men or animals. Repeated inoculations of germ-bearing lymph have been made in guinea-pigs, rabbits, and other test animals, and almost invariably without any pathogenic results.

Law Cases.

IMPORTANT DECISION AFFECTING PLUMBERS' APPRENTICES.

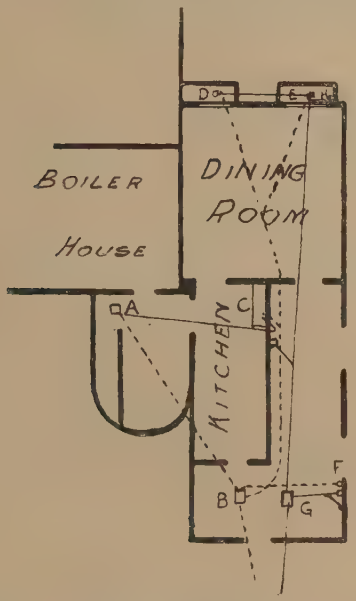
IN the Chancery Division of the High Court of Justice an application was recently made that the apprenticeship deed of a ward of Court should be settled by the Plumbers' Company, and a form drawn up by the Company has been approved by the Judge, Mr. Justice Romer. In addition to the usual provisions based on the indenture for apprentices in the City of London, approved by resolution of the Court of Common Council, April, 1889, special covenants were inserted "binding the apprentice to diligently attend evening classes of technical instruction as directed by the master, under penalty of a reduction in wages, and binding the master to provide for attendance of the apprentice at the courses of instruction and the examination in knowledge of sanitary plumbing and workmanship prescribed by the Plumbers' Company or any statutory body empowered to keep a register of qualified plumbers." These covenants were introduced with the object of encouraging and promoting the apprentice's efficiency, and are novel in the practice of the City of London and the Court of Chancery.

Notes and Queries.

982. — DRAINAGE OF A PUBLIC INSTITUTION: METHOD.—"C. B. M." writes:—"I should be much obliged for your opinion upon the plan of drainage submitted herewith of the cellars and basement kitchens of a public institution. Will you kindly advise whether you consider the proposed method satisfactory, or do you suggest any alteration?"

Answer.—The mode of drainage as proposed is not satisfactory. Our correspondent's plan should be modi-

fied, and we advise him to carry out the drainage on the lines shown by us on the plan which we reproduce. The dotted black lines show our correspondent's proposed method. We must point out that drains should be laid as far as possible in straight lines from point to point, and that a fresh air inlet be always provided to the disconnecting trap or disconnecting chamber, whichever be used, and that an outlet shaft be carried up at the highest point of the drain to the roof of the building. In addition to this, where drains run under buildings, they must be surrounded with Portland cement concrete,



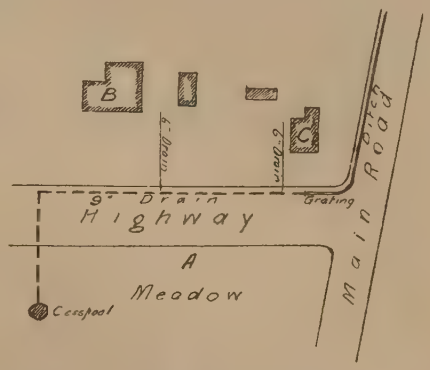
of a thickness equal to the full diameter of the drain, and adequate means of ventilation must be provided in connection with such drain at each end of the portion as is beneath the building. The joints of the drain should be made of neat Portland cement, and before the pipes are covered they should be tested for soundness by the hydraulic or water test. Our correspondent would derive benefit from a careful study of Spinks' "House Drainage Manual," price 5s., obtainable from the Sanitary Publishing Company.

The plan of basement is reproduced, showing in dotted lines correspondent's proposed mode of drainage. The proper mode of drainage, suggested by us, is shown by continuous thin lines.

References.—G, disconnection chamber with trap and fresh air inlet, carried by means of pipes against wall. A, well, with overflow pipe to open air, to discharge over a trapped gully. C, sink, with waste pipe discharging in the open air over a trapped gully. D, gully in area, drain from which is made to discharge over gully E in area. E, gully in area receiving also drainage from gully D in other area. F, rain-water pipe made to discharge over a trapped gully. H, ventilating shaft.

983.—NUISANCE FROM OVERFLOWING CESSPOOL.—"Judex" writes:—"Will you kindly advise me who is responsible for the abatement of a nuisance from an overflowing cesspool, under the following circumstances:—A, the owner of land shown on sketch, complains of a nuisance on his land caused by a cesspool overflowing, into which B and C drain. The Local Authority call upon A to abate the nuisance himself, as existing on his own property and by his sufferance. A refuses, and B is served with a notice. B refuses to do anything on the ground (1) that B and C have an easement in A's property. (2) That the surface water drain in road is a sewer, as it receives the drainage from B and C. (3) That even assuming B and C to be responsible, they have no right to trespass on A's land to cleanse the cesspool. There is no question as to the nuisance, or of the highway drain having been originally constructed for surface water only. You will observe that the cesspool receives not only sewage, but the surface water from the high road."

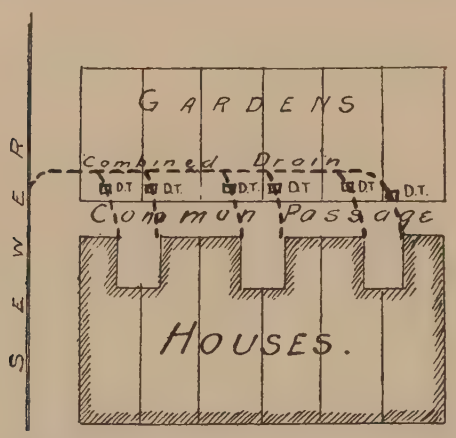
Answer.—We are of opinion that the Local Authority will not be enabled to enforce the cleansing of the cesspool upon A. It is not stated by whom the cesspool was originally constructed. If it was constructed by the Highway Authority for the purpose of receiving surface water from the road, the duty of cleansing the same will, we think, devolve upon the Sanitary Authority. It must be observed that a cesspool has been held not to be a sewer, in Meader *v.* West Cowes Local Board (61



L. J., Ch. 561; L. R. 3, Ch. 18). In that case several houses drained by one common drain into one cesspool, from which was an overflow crossing, without licence, the land of a neighbour, who blocked the overflow pipe, causing the sewage to dam back on plaintiff's land. It was held that neither the cesspool nor the overflow pipes therefrom were a public sewer, and that the duty of abating the nuisance caused by the overflow devolved upon the plaintiff, who was the owner of the land whereon the cesspool existed and of the houses. In the case named by our correspondent the circumstances are somewhat different, inasmuch as the sewer in road is virtually a public sewer used for the purposes of road drainage, and, if we understand rightly, permitted to be used by the Local Authority for receiving sewage in addition. Under the circumstances we are of opinion that the Local Authority would not be able to succeed in attempting to enforce the abatement of the nuisance on any one of the owners concerned.

984.—COMBINED DRAINAGE: DRAIN OR SEWER.—"B. G. B." writes:—"The Surveyor has compelled a builder to provide intercepting traps upon each house drain of a row of houses before they join a combined drain running through the gardens at the rear, and joining the sewer in street at end of row. The houses and land all belong to one man at present, namely, the builder. Query: (1) Is the combined drain a drain or sewer? The intercepting traps placed in the position named appear to point to its being a sewer; but as it is upon private property, I do not think the Sanitary Authority have any right of access, except in case of nuisance, or to make connections to it. (2) In the likely event of houses being sold to separate individuals, I presume it would become a drain, repairable by all users in determined proportions, as provided by Sec. 19 of the Public Health Acts Amendment Act, 1890. If it is a sewer under (1), and a drain under (2), it appears that whether it is a drain or sewer depends absolutely in such cases upon the ownership of the houses, and that what is a drain one day may be a sewer the next, or *vice versâ*. Am I correct in this interpretation? Sketch plan is submitted."

Answer.—(1) We are not informed whether the houses are being newly erected, but conclude that this is the case. It has been repeatedly decided that a drain receiving the drainage of two or more houses is a sewer within the definition of Secs. 4 and 13, and that by Secs. 15 and 19 of the Public Health Act, 1875, the Local Authority are required to keep such sewers in repair. But in Seal *v.* Merthyr Tydfil District Council (61 J. P., 551) the Queen's Bench Divisional Court (July 11th, 1897), decided, on appeal from the magistrates' decision, that a combined drain receiving the drainage of twenty houses, and which combined drain ran through private gardens, and was connected with the sewers of the Council, could not be held to be a sewer until it came out of private property into public streets, so that the world at large could drain into it. A Local Authority have an implied right of access on lands for the purpose of examining or repairing sewers; and in case of refusal they may, as provided by Sec. 308 of the Public Health Act, 1875, after written notice to the owner or occupier, apply to a court of summary jurisdiction for an order authorising them to enter, examine, and lay open the said lands and premises for the purposes aforesaid. (2) The points mentioned by our correspondent are such as have been found



by experience to render the provisions of Sec. 19 of the Public Health Amendment Act, 1890, very difficult to put in operation.

985.—Trapping of Soil Pipes.—Disinfectants.—"Negus" writes:—"Will you kindly answer the following questions:—(1) Do you approve of a soil pipe being trapped at the foot when the closets emptying into the same are not efficiently trapped? (2) Will a D trap syphon? (3) In what proportion would you use corrosive sublimate to disinfect the excreta of a typhoid patient?"

Answer.—(1) Providing the house drain is properly trapped and disconnected from the sewer or cesspool in conformity with the requirements of the Building Bye-laws (Model Series), we do not advise the provision of a trap at the foot of a soil pipe. Where, however, there is no disconnecting trap on the house drain, it is advisable to have a trap with fresh air inlet at the foot of the soil pipe, rather than incur the risk which is ever present of sewer gas finding its way into the house by means of the water-closet, the trap of which may become unsyphoned or defective. Moreover, should the water-closet at any time require repair and the trap to the water-closet be removed, sewer gas has an unobstructed access into houses. (2) A D trap will not syphon under ordinary conditions, and it is only possible owing to exceptional conditions, such as when a piece of rag or absorptive paper may hang over the lip of the trap, one end being immersed in the trapping water and the other end falling over the lip, thus acting by porosity to drain off the water below the water-seal level. (3) For the disinfection of excreta from typhoid patients corrosive sublimate should be used in the proportion of 1 in 500 (one grain to one ounce of water). The solution is one, however, which requires much caution in using, as fully described by us in our answer to Query 520 in our issue of December 31st last, which should be referred to. There are now many disinfectants manufactured which are equally as effective as that named by our correspondents, and which may be used with less danger than corrosive sublimate, such as St. Bede's disinfectant, which is a convenient preparation containing corrosive sublimate, and Kuhn's, Fleming's, and Griffiths' disinfectants, as advertised in the colums of this journal.

986. — Written Complaint as to Defective Drains, &c.: Who may Make. — "Constant Subscriber" writes:—"I should be glad to know if in your opinion a Sanitary Inspector or Medical Officer of Health are competent persons to make a written complaint to the Local Authority under Sec. 41 of the Public Health Act, 1875. The section reads 'any person.' Of course the Inspector and myself are included in that, but further on the Inspector is to be empowered to do various things. I shall be glad to know your opinion on this matter. Of course, I am referring to cases which come to the knowledge of the Inspector and myself in our official capacities, and not in any way where we are concerned as private individuals."

Answer.—We known of no decision on the point, but incline to the opinion that either the Inspector of Nuisances or Medical Officer of Health may furnish the written application to the Local Authority under the provisions of the section referred to. Inasmuch, however, as there will, we anticipate, rarely be any difficulty in securing a written application from a private person, we should advise that this be done whenever practicable.

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Omagh.—March 5th.—Sanitary Works.—Mr. William Cathcart, clerk, Poor Law Office, Omagh.

Abram (near Wigan).—March 7th.—Removal of Nightsoil.—The Sanitary Inspector's Office.

Dewsbury.—March 7th.—Disinfectants.—Mr. G. Trevelyan Lee, town clerk, Town Hall, Dewsbury.

Felling (Durham).—March 7th.—Scavening.—Mr. H. Miller, Wesley-terrace, Felling.

Heswall-cum Oldfield (Cheshire).—March 7th.—Sewer, &c.—Mr. A. Hughes, surveyor, 24, Egerton-road, New Ferry.

Handsworth (Staffs).—March 7th.—Scavenging.—Mr. E. Kenworthy, surveyor, Council House, Handsworth.

Rochford. — March 7th. — Disinfectants. — Mr. Frederic Gregson, clerk, Southend-on-Sea.

Upton (Cheshire).—March 7th.—Sewers, &c.—The Surveyor's Office, 24, Egerton-road, New Ferry.

Bedlington. — March 8th. — Sewer, &c. — Mr. Cuthbert Brown's Office, Bedlington.

Tonyrefail (Llantrisant).—March 8th.—Sewers, &c.—Mr. Gomer S. Morgan, surveyor, Pontyclun.

North Shields.—March 9th.—Scavenging.—Mr. Augustus Whitehorn, clerk, 60, Saville street, North Shields.

Sandiacre (Derby).—March 11th.—Scavenging.—Mr. J. W. Newbold, clerk, Becket-street, Derby.

Broadstairs.—March 12th.—Sewerage Works.—Messrs. Henry Law and Son, 17, Victoria-street, Westminster, S.W.

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CLERK OF WORKS (NEATH, March 28th).—For the Neath School Board. Salary £2 2s. per week. Mr. J. Cook Rees, architect, Neath.

ENGINEER (BIRMINGHAM, March 9th).—For the Public Work Committee. Salary £300 per annum, rising by increments of £25 per annum to £350 per annum. Mr. John Price, city surveyor, Council House, Birmingham.

INSPECTOR OF NUISANCES (CARMARTHEN, March 7th).—Salary £80. Town clerk, Carmarthen.

INSPECTOR OF NUISANCES, &C. (CASTLE BROMWICH, March 12th).—For the Rural District Council. Application forms to be obtained at the office of Mr. John North, clerk, 205, Vauxhall road, Birmingham.

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THE

Sanitary Record,

MARCH 11, 1898.

Notes.

The County Council Elections.

THE elections for the County Council of London have resulted in a substantial victory for the Progressives, who have secured sixty-eight seats as against forty-eight seats held by the Moderates. This represents a net gain for the Progressives of twelve seats.

The results for Central Hackney, which is at present represented by two Progressives, have still to be declared; and on the assumption that there will be no change in this constituency, the total majority of the Progressives in the new Council will be twenty-two—a very decided majority, which will give them every opportunity they could wish to unfold their policy according to their desires. The elections have undoubtedly been fought on strictly party lines, and it now remains to be seen whether, in shaping the future policy of the Council, the majority will give it a party character. It is undeniable that there will be a strong temptation to do so; but it is sincerely to be hoped, in the interests of the municipal government of London, that party politics will not be carried into the Council Chamber. What effect the Progressive victory will have on the Government's promised Bill, dealing with the government of London, is not yet known; but it is stated that the Bill will be proceeded with in accordance with the original intention, though it is possible that its character may now be subject to some modification.

The London University Bill.

While London is still in the throes over the problems of municipal government, it is satisfactory to know that the question of its higher education is now in a fair way to be settled. On Friday last the House of Lords passed the second reading of the Bill which is intended to establish a Teaching University for London. The measure is substantially the same which passed through the Upper House last year, but it has been modified in various particulars in order to conciliate the opposition which it then met with—opposition which the Duke of Devonshire said was principally based on certain unfounded apprehensions that the high standard of the London degree would be lowered. As the Bill has the almost unanimous support of the teaching institutions of London, and is backed by an overwhelming body of scientific opinion, it is hoped that it will become law this session. So far from its tending to depreciate the standard of the London degree, it seeks to enhance its value, and to this end it is necessary, as Lord Reay said, to increase the opportunities for scientific work, and to give the students more scope for individual research and originality than they at present possess.

Factory Act questions in Parliament.

On the Vote on Account for the Civil Service and Revenue Departments last week an interesting debate took place with regard to the exemption of fish-curing from the operation of the Factory Acts, the prevention of lead poisoning in potteries, and the position and duties of female Factory Inspectors. The Home Secretary acknowledged the importance of the various questions raised. He admitted that the law in regard to the fish-curing industry was not in a satisfactory state, and promised to consider the means of diminishing the existing exemptions, which were undoubtedly at present too wide, without an undue disturbance of the trade. With regard to female Inspectors, or what was called the Women's Department of the Home-office, several points were raised in connection with their status and powers, but the prevailing note of the discussion was one of commendation and praise of the efficiency with which they discharged their duties. Mr. Asquith pointed out that this was especially gratifying when one remembered the doubt that was at first entertained of the policy of appointing women for the inspection of factories and workshops. The success of this policy is now acknowledged to be such that no one at the Home-office would think of endeavouring to carry out the work of the Department without a large infusion of the female element.

Lead Poisoning in Potteries.

The danger to health in the case of women and young persons engaged in potteries where lead is necessary for glazing and other processes in the manufacture, was emphasised by all the speakers, and the Home Secretary admitted that the special rules made in 1893 were not adequate for their protection. Various specific remedies were suggested in the course of the debate. Sir Charles Dilke considered that the susceptibility of women and children to lead poisoning was such as to justify the total prohibition of their employment in the industry. Sir Matthew Ridley thought that an attempt might be made by the Home-office to co-operate with manufacturers in endeavouring to discover a less unhealthy ingredient to be used in potteries than poisonous lead; and Mr. Asquith desiderated some beneficent invention—some mode of respirator—so contrived as to prevent the inhalation of noxious gas or dust without causing discomfort to the wearer. Another point in regard to which the existing law is felt to be unsatisfactory is that, under the definition of "accidents" in the Compensation Act of last year, it is impossible for a person to obtain compensation for even permanent injury to health on account of the dangerous atmosphere of the workshop arising from the material used in the ordinary course of manufacture.

The Small-Pox at Middlesbrough.

It is satisfactory to learn that the outbreak of small-pox at Middlesbrough shows signs of diminution, and that the claim of the Authorities that they have now got the upper hand of the epidemic appears to be justified. The number of cases notified last Friday was only twenty-four, as contrasted with sixty-five notified one day earlier in the week; of these, however, it is to be observed that twenty-one were from houses previously free from the disease. The total number of cases recorded since the commencement of the outbreak, up to Friday, was 810. The temporary hospitals are now in thorough working order. There are 585 available beds in the buildings already completed, and when the third section of the hospitals is finished, there will be other 300 beds provided. On account of the danger of the spread of the disease by clergymen visiting the patients, the Sanatorium Committee have decided not to allow clergymen to visit the hospitals, unless they agree to submit themselves to be disinfected to the satisfaction of the doctor. The Local Government Board have intimated that, considering the proportions that the epidemic has attained, they are prepared, if requested, to send down a special

medical man to assist in dealing with the cases. If, however, the present hopes of the Authorities are fulfilled, perhaps it will not be necessary for them to avail themselves of this offer of assistance.

Adulteration of Dairy Produce: The Foreign Trade.

Mr. Balfour's assurance to the deputation of Unionist members for agricultural constituencies that the Government hope to find a favourable opportunity to bring forward legislation regarding the adulteration of dairy produce, though a little vague, awakens the hope that the subject will soon be dealt with and placed on a satisfactory footing. As things are at present there is no doubt that foreign adulteration is largely responsible for the falling off of British trade in these commodities, and it must at the same time be admitted that the shortsighted policy of many British farmers is a not unimportant factor in the situation. It has been stated that in 1876—78 the proportion of imported dairy produce to the home production was 36·3 per cent., and in 1893—95 it had reached the high figure of 51·3 per cent. At the present time it is believed that the proportion is still larger, and that the amount of foreign butter and cheese in our markets is considerably in excess of the home production of these articles. Now a great deal of the butter imported to this country is "blended." About 150,000 cwt. of the Danish butter we receive every year is imported from Sweden, blended, and then re-exported here. So too, in France and Germany, Normandy in particular being considered a peculiar adept in this form of adulteration; the native butter is adulterated with various imports, and the blend is then shipped to the British Isles.

Defects of the Home Produce.

These facts show the necessity for legislation on the subject so far as foreign produce is concerned. The importation of foreign butter, however, be it ure or adulterated, would not have been so great were it not that even the blend is often better as well as, cheaper than the average English article. The best British butter is unsurpassed, but much of what is on the market is of very inferior quality. In Ireland, moreover, it is stated that home butter suffers much by comparison with Danish in point of general cleanliness and appearance. Probably, also, the mode of shipment has to be considered, for the experience of Canada has been that both the quality and the flavour of their butter placed on the English market has undergone a great improvement since the utilisation of the cold storage accommodation on board ship. There are supplementary considerations to be kept in view by those who wish to see British dairy produce raised to the position that it ought to hold, but the really essential point is that a good, wholesome, and uniform standard for milk should be established. The varying standards that are at present in vogue are most unsatisfactory. We see that Mr. Carrington Smith, lecturing to the London Farmers' Club, advocated a standard of not less than 3 per cent., or even 3·25 per cent., of butter fat, a standard which is certainly considerably higher than what is generally insisted on; but it is good to have a high deal.

Model Regulations for Cowsheds.

A suggestion has recently been made that it would be of great service to Local Authorities and dairy farmers in determining the requisite air space and other sanitary conditions for cowsheds, if the Local Government Board were to construct a model byre, and by actual experiment ascertain approximately how much ventilation is essential for the health of the cows and the safety of the public. Hitherto the Local Government Board have fought rather shy of the question. According to the existing law, Local Authorities are empowered to make such regulations as they deem necessary, subject to the veto of the Local Government Board, a veto which is rarely exercised. The result is that the regulations issued by Urban and Rural District Councils vary widely—"model regulations" they are called—and the issue of some of these model regulations, requiring the provision of from 800 to 880 cubic feet of air space per cow, has excited a good deal of alarm among dairy farmers, on account of the impossibility of conforming with them without a very serious expenditure. The farmers growl, for they say they are already sufficiently overburdened, and from one quarter we have even heard the suggestion of a farmer's strike!—which, however, we do not suppose is to be seriously treated.

The Difficulty of a Standard.

In some respects it must be admitted that there is some cause for these complaints. Cowsheds are not all alike; the greatest differences are to be found both in construction and situation. These are factors which have almost as important a bearing as cubic capacity on the question of ventilation, and probably due allowance is not always made for their influence. It is impossible to expect that a definite standard can ever be attained; the most that we can look for is an approximation. But with the admitted difficulty of satisfying everybody, and the hardship that is involved in many cases by a lack of uniformity, we think it is eminently desirable that so important a matter should not be left entirely to the discretion of the Local Authorities. The suggestion has often been made that the Local Government Board should issue forms of model regulations for the use of District Councils, which would insure some measure of uniformity; and it is probable that this may be done after the issue of the report of the Royal Commission on Tuberculosis, in which the question of air space in cowsheds is certain to be treated.

Honour to a Statistician.

An interesting ceremony took place at Marlborough House the other day, when the Prince of Wales, as President of the Society of Arts, in presence of a distinguished gathering of scientific men, presented the Albert Medal to Mr. George James Symons, F.R.S. The honour was conferred in recognition of the valuable services Mr. Symons has rendered to sanitary engineers, and to the country at large during the past forty years, by his systematic observations of the rainfall of the British Isles. The system has been gradually built up and

matured, and the observations are now carried on at over 3000 stations. The results are carefully recorded and tabulated, and graphically set forth in Mr. Symons' annual publications. The honour accorded by the Council of the Society of Arts is well merited.

Statistics the Foundation of Sanitary Science.

The value of statistics to sanitary science was emphasised by Sir William Gairdner in his lecture which we reported last week. He there pointed out that sanitation as a moderately exact science could not be said to exist until the establishment of death and disease rates, for the purpose of studying the incidence of particular diseases in different localities, and under various conditions of life. Prior to this epoch, much valuable work had been done by the early sanitary reformers, such as Sir Edwin Chadwick, Lord Playfair, Dr. Southwood Smith, and others, to whom all honour is due on account of their pioneering efforts; but their methods were not scientific, and until the establishment of a scientific method little real progress was possible. Progress, however, can be distinctly traced from the time of the application of the methods of science to the investigation of the incidence of disease. It was Dr. Farr, head of the office of statistics of the Registrar-General of England, who first conceived the idea of furnishing a calculus to ascertain this incidence by means of the death-rate, and it is upon the system that he founded that all modern sanitary science is based.

The Death-rate System.

Dr. Farr mapped all England out into districts for the purpose of estimating the number of deaths in proportion to the population of each district. In only three districts was the death-rate found to be so low as 15, in fourteen districts the rate was 16, and in forty-seven districts it was 17. The last-mentioned rate was accordingly selected as the standard. Now, to compare this initial standard with that now in operation, at once gives us a vivid idea of the results effected by hygiene. Dr. Tatham, the present head of the Statistical Department, while working on exactly the same lines as Dr. Farr, though with still greater precision, is now able to operate with a standard death-rate of 15 in the 1000, instead of 17; during the last decade one-sixth of the population of England in 263 districts had death-rates below 15 in the 1000, and fully a quarter of the population were below the ideal standard aimed at by Dr. Farr.

INSANITARY FLOORING IN PUBLIC AND PRIVATE BUILDINGS.

The results of some interesting researches showing the dangers from a sanitary standpoint of hollow floors, false ceilings, and of the joints and crevices which are so frequently found in building constructions, are embodied in a recent issue of a German contemporary, *Industrielles Echo*. The investigations were made by Dr. Emmerich, and extended over a large number of public and private buildings, his *modus operandi* being as follows:—In each room a series of samples of pugging were taken, such samples representing the full thickness of the pugging in each case. Every sample was separately and carefully tested as to its chemical composition and the amount of organic matter contained in it. This involved an immense amount of labour on account of the large number of the samples, and also entailed some amount of danger owing to the nature of the material dealt with. The result of the numerous tests goes to show that there is no soil so richly contaminated with decomposing organic matter as "pugging," which, during the entire time of their being in use—in some cases for more than a generation — receives all manner of organic particles, spores, and liquids which reach it through the cracks and joints of the flooring, thus forming a mass which, in some neighbourhoods—Rhenish Hessia, for instance—is used as manure whenever the floors are taken up. And for use as such it is eminently fitted on account of the very large proportion of putrescent organic matter it contains. In one instance it was ascertained that in a quantity of such old pugging the fermentation of the numerous fungoids it contained carried the temperature to 32 deg. Cent. in the shade, the temperature in the air being only 16 deg. This defect is accentuated by the circumstance that it is the almost universal custom to use dry rubbish from old buildings for such pugging, that being generally the driest material obtainable, so that all manner of ferments and bacteria derived from those ancient times when epidemics were most rife are brought into the modern dwelling.

Dr. Emmerich found such pugging fouled to an enormous extent by fæces and other putrescent matter, such as rags, straw, paper, potato peal, vegetable offal, hair, bones, sweepings, &c. In one new building these nursery grounds for bacteria amounted to 27,158 kilos. of dry albumen (calculating the same from the proportion of nitrogen). Now a human body contains about 9 kilos. of albumen, so that the rotting mass in this one building alone was equivalent to 3000 corpses rotting under the floor, the smell being masked solely by the deodorising effects of the earth and ashes mingled therewith.

Dr. Emmerich concludes his report as follows:—"It is small wonder, then, that local epidemics occur even in the cleanest new houses." Even if the best material is used as pugging, an ancient abuse of the workpeople employed in the building leads to its contamination, and this explains why epidemics start just from one or two corners of a given room. On examination of a certain sample, the medical men testing it were invariably made sick when dealing with it. Owing to more strict supervision by the Sanitary Authorities, who cannot possibly be too rigorous in matters touching the public health, old rubbish is now-a-days less frequently used as pugging, sand and ashes being more usually employed; yet in many instances gross faults could be cited, and many a new smart-looking residence contains breeding grounds for vermin and the more insidious bacteria below its floors.

Builders and owners would, we think, do well to ponder over these facts, both in connection with the construction of flooring in new buildings, and in the reconstruction of old ones, and make it their duty to see that filth is not introduced to the detriment of the same by workmen.

NOTES ON
PRACTICAL SANITARY SCIENCE.

By WILLIAM H. MAXWELL.

Assistant Engineer and Surveyor, Leyton Urban District Council, Author of "Drainage Work and Sanitary Fittings," "Ventilation, Heating, and Lighting," &c., Certificates of the Association of Municipal and County Engineers, and Sanitary Institute.

No. 52.—REFUSE DESTRUCTORS.

(*Continued from page* 223.)

Beaman and Deas Destructor.

One of the most modern destructors is that of Messrs. Beaman and Deas[133], which is illustrated in plan and section by the accompanying figures (20 and 21), which show the general arrangement and construction of the furnace. The Beaman and Deas destructor is, at the present time, commanding a large share of attention from Public Authorities throughout the United Kingdom, and installations have already been erected at Warrington, Dewsbury, Leyton, &c., whilst Barry, Bermondsey, Burnley, Colne, Nelson, St. Helens, Stretford, Streatham, and Rotherhithe, are either erecting, or have decided upon the erection of this type of furnace.

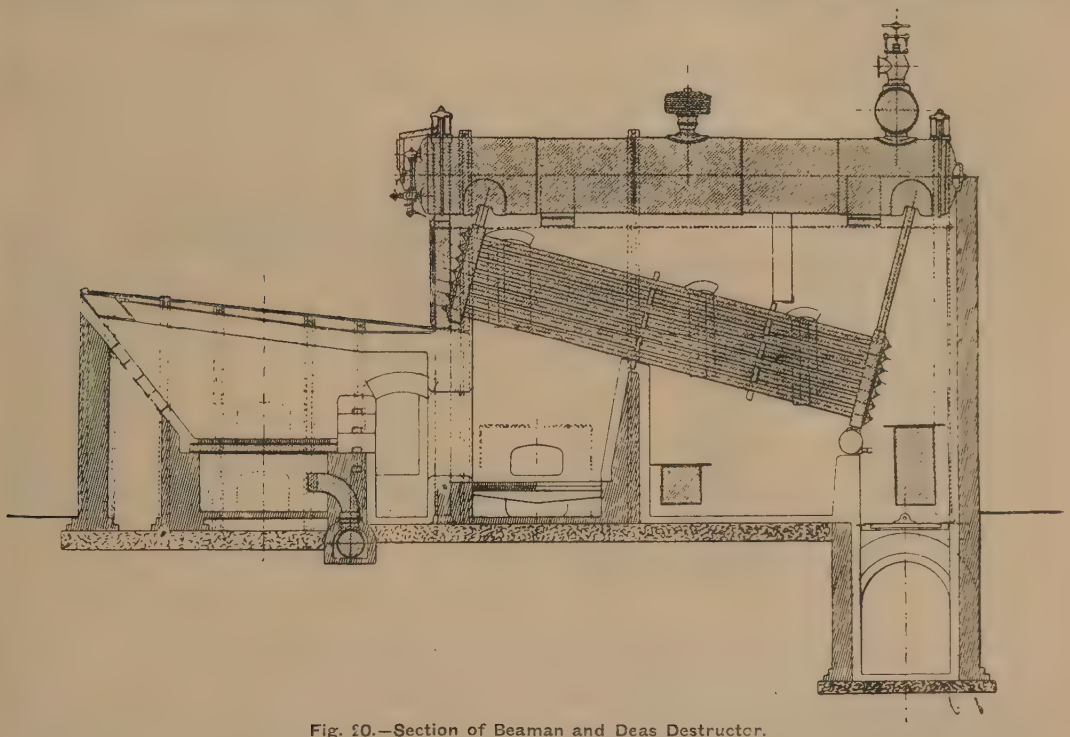


Fig. 20.—Section of Beaman and Deas Destructor.

The material to be burnt is carted up a short incline to the top of a platform, which measures only 8ft. 9in. from the ground level, and is tipped direct into a hopper mouth about 1ft. 6in. square; after passing which it falls down a fire-brick hearth supported on T irons, as shown, and having an inclination with a horizontal line of about 52 deg. At the bottom of this incline the refuse is received upon a fire-grate area 5ft. square, which is fixed level at a height of about 2ft. 9in. above the floor of the ashpit. The fire-bars are of the ordinary stationary type, these having been found by experience to give the most satisfactory results. They have spaces between them of only $\frac{3}{32}$in., and the weight of fine ash passing through from a week's work of five days—and burning about 100 tons—only amounts to 3½ cwt. Vertically under the bridge between the furnace and the combustion chamber is an air culvert, on the top of which are the air blast pipes, about 12in. in diam., and which discharge into a hermetically-closed ashpit immediately under the fire-bars. The air is supplied from fans at a pressure of about 2in. of water, and is controlled by means of baffle valves worked by handles on either side of the furnace, handy to the attendant. The forced draught keeps the bars cool, and the wear and tear is found by experience to be very slight.

The fumes from the charge drying on the hearth pass through the fire, directly over the fire-bars and over the fire-bridge. The bridge is perforated longitudinally with air passages, as shown in the figure; these perforations connect with a miniature flue, leading from a grated opening on the face of the brickwork outside. This creates a strong draught, and the air in the course of its passage becomes heated, is discharged near the top of the bridge, and thus meets the fumes passing over into the combustion chamber, and ensures their perfect combustion by means of this auxiliary supply of heated oxygen; the principle of the action being, in fact, somewhat similar to that of the Bunsen burner. The combustion chamber, which attains

[133] Patents No. 15,598 (1893) and 23,712 (1893).

an exceptionally high temperature, is provided with large iron doors at each end, for the admission of infected or other articles, and also for access for the periodical removal of fine ash from the flues.

The Beaman and Deas furnace being a good steam or power producer, a boiler to each pair of cells may be advantageously fixed in combination therewith for the supply of power for any purpose for which it may be required, such, for example, as the driving of fans, lifts, pumping, or other machinery, or for generating electricity. The boiler shown in the illustration is a water-tube boiler of the Babcock and Wilcox type, and is heated by the gases from the combustion chamber which pass, on their way to the main flue, three times between the boiler tubes. A secondary furnace is shown under the boiler for raising steam when the cells are out of use.

The original points claimed by the patentees for their invention are, briefly: a destructor furnace consisting essentially of a flat or inclined furnace grate, an inclined feeding hearth, a reverberatory arch extending over the grate and hearth, a vertical perforator fire-brick screen, a fire-bridge, and a chamber formed between the screen and the bridge.[134]

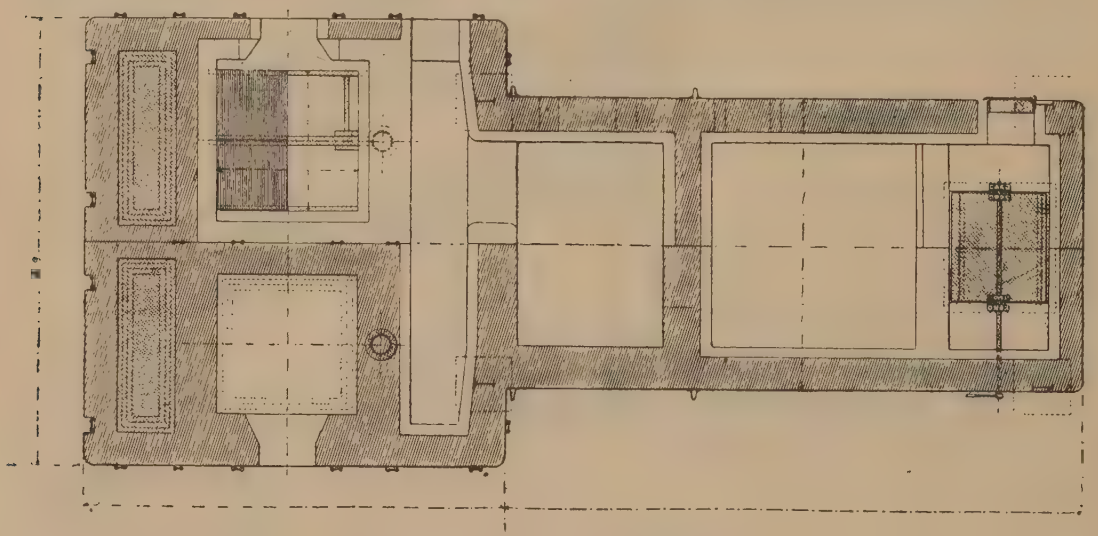


Fig. 21.—Plan of Beaman and Deas Destructor.

The process of burning the refuse is, briefly, as follows:—The material to be consumed is carted to the tipping platform, and, without undergoing any process of screening or selection, is discharged through the hopper, as above referred to, on to the inclined hearth. A charge is meanwhile in course of destruction on the horizontal fire-grate, and when this is consumed the furnace is clinkered, and the charge lying on the inclined hearth, which has meanwhile, to a considerable extent, been dried by the heat deflected from the fire-brick hearth and the general heat of the furnace, is in turn drawn on to the horizontal fire-grate, and another charge takes its place on the inclined hearth. The clinkering and re-charging of the furnace is done alternately, the better to preserve the heat in the combustion chamber, which is stated to be maintained at a temperature of 2000 deg. Fah. Inasmuch as all the products of combustion have to pass through this chamber it is impossible for any undecomposed vapours to escape into the main flue beyond, and one of the most important of all questions appertaining to the disposal of refuse, viz., the absolute avoidance of nuisance, is thus provided for.

In relation to the efficiency of the working of the Beaman and Deas furnace, Mr. C. Estcourt, F.I.C., Analyst to the City of Manchester, has made the following observations in his report on the destructor at the Longford depôt of the Warrington Corporation:—"In the first place, I may state that in my opinion (grounded upon the observations I have made) the use of this destructor does not cause the slightest offence or nuisance; secondly, that the refuse dealt with is reduced to a very small quantity of clinker, containing no organic matter. I took particular notice of the chimney shaft, and I may say at no time did I see any charred paper or any other dust coming from it. . . . From my examination of the gases coming from the chimney shaft, I am quite sure that they are perfectly innocuous, and free from anything harmful. No organic or mephitic vapour can escape even into the flue during the process of combustion in this destructor.

"I have made analyses of the gas drawn from the chamber in the flue, under all the three main conditions of working, *i.e.*, (1) immediately before clinkering; (2) during clinkering; (3) immediately after clinkering, when the new charge of refuse had been drawn into this destructor, and I can state that I did not find any harmful gas escaping from these furnaces.

"I found no trace of sulphuretted hydrogen. There is no trace of carbonic oxide, showing that practically *perfect combustion* is attained by this destructor.

"I observed, also, that during the process of burning the silicious particles, &c., appear to be carried in a fused condition up to the arch of the

[134] Patent No. 23,713 (1893).

furnace, and attach themselves to the brickwork, thus *forming a complete protection to the furnace*, and obviating the danger to which many destructors are subject, of being burnt out. I was shown a brick from the arch, which had been in fourteen months, and which gave no sign of wear.

In regard to the formation of these stalactites upon the roof of the furnace, Mr. J. Carter Bell, F.I.C., of Manchester, observes, in a report on the Warrington Destructor,[135] that objections may be taken to the great heat generated on the grounds of its being likely to destroy the lining of the furnace; but, as a matter of fact, "this great heat is an immense advantage, for through the blast which is blown in a fine spray or shower of clinkers is formed, which fixes itself upon the roof and exposed portions of the furnace in a stalactitic form, thus protecting the brick lining from the intense heat. Some of these stalactites were knocked off in my presence, which I have analysed, and the following is the analysis :—

Silica	55·364
Oxides of iron	15·711
Alumina	17·362
Lime	5·390
Magnesia, potash, soda, sulphuric acid ...	6·173
	100,000

"This furnace has been at work since August, 1893, and is as good now as the day it was erected. I consider the furnace to be a perfect destructor, and very much superior to any others I have seen."

Another very important point has been pointed out by Mr. C. Estcourt, viz., that pieces of paper and other light material lying in any part of the furnace, even directly over the blast, retain their position until consumed. One serious source of nuisance common to other forms of destructor is thus avoided, namely, the emanation from the chimney shaft of pieces of charred paper, &c.; also the fumes from the fresh charge, lying upon the hearth, pass through the fire directly over the fire-bars.

In March, 1896, a series of tests on the Beaman and Deas furnace at Warrington were made by Mr. F. F. Bennett, M.I.E.E., of Preston, for the purposes of his report to the Electric Lighting Committee of the Radcliffe Urban District Council, who have had the question of a joint destructor and electric lighting scheme under their consideration. During a *six-hour* test it appears that 9 tons 13 cwt. 3 qr. of Radcliffe town refuse were consumed. The average of thirteen readings during the test gives the following results :—

Steam pressure	45 lb. per square inch.
Temperature of feed-water...	141·5 deg. Fah.
Temperature of *flue* gases ...	519 deg. Fah.
Draught in *flue*	½in. (water gauge).
Draught in *ashpit*	2·5in. (water gauge).

Each furnace was charged once every half-hour—a charge consisting of 16 cwt. 16 lb. of refuse. The weight of water evaporated was 22,000 lb., and therefore, for every 1 lb. of refuse destroyed, 1·11 lb. of water was evaporated. The material contained a considerable quantity of moisture, being 48·44 per cent. of the whole. Had the refuse contained no moisture, the amount of water evaporated would have been 1·98 lb. for every pound of dry refuse destroyed, so that the drier the refuse the better the result.

With a good compound condensing engine, requiring the evaporation of 20 lb. of water per indicated horse-power, the result of the test would have been a development of 1100 indicated horse-power, or 183 indicated horse-power per hour. Working on the basis of a former report, Mr. Bennett calculates that "this would supply sufficient energy for 3660 30-watt lamps per hour. In other words, with 10 tons of refuse, a pair of Beaman and Deas destructors, and one Babcock and Wilcox 200-horse power boiler, you would be able to run 3660 30-watt lamps for a period of six hours, and if the refuse is in a drier condition, a still better result would be obtained. With two pairs of destructors and two such boilers, with fan and pump, including delivery and erection, and costing about £3660, double this quantity of lamps could be supplied per day, requiring about 120 tons of refuse per week."

One pound of ordinary slack coal will evaporate from 4 lb. to 6 lb. of water; and 1 lb. of good coal from 8 lb. to 10 lb. of water. It may therefore be safely assumed that house refuse, for heating and evaporative purposes, is equal to 25 per cent. of the value of slack.

Huddersfield Corporation Test at Warrington.—As this Authority wished to ascertain what the Beaman and Deas furnace could accomplish with their refuse and sludge they sent to the Warrington destructor 4 tons 12 cwt. of *sludge*, which was mixed with 6 tons 12 cwt. of *refuse*—a proportion of not quite 1½ to 1—making a total of 11 tons 4 cwt. This was burnt in 5¾ hours, being at the rate of 24 tons 9 cwt. per cell per day of 24 hours. The residue of the whole amounted to 2 tons, or 17·85 per cent.

The amount of water evaporated on the occasion of this test was 32,000 lb., which equals 1·27 lb. of water per pound of refuse and sludge consumed, with the feed-water from and at 65 deg. Fah.

The sludge at Huddersfield is of a moist description, and the sample sent was thoroughly saturated by being exposed to heavy rain.

The test was carried out in the presence of two of the Huddersfield Corporation officials, namely, the Assistant Surveyor and the mechanical engineer.

The following are some of the chief results obtained at the Warrington installation in a twenty-four hour test made in November, 1893, by Mr. G. Darley, Superintendent Ashpit Cleansing Department, Leeds, and Mr. G. T. Carter, of the City Engineer's Office, Leeds :—

Nature of fuel	Unscreened refuse
Quantity of fuel per hour... ...	2231 lb.
Quantity of water per hour (evaporated)	2556 lb.
$= \frac{2556}{20} = 127$ I.H.P.	
Percentage of clinker	27·9
Pressure of steam maintained...	68 lb.
Temperature of air in boiler-house	45 deg. Fah.
Temperature of feed-water ...	104 deg. Fah.
Temperature of gases leaving damper	650 deg. Fah.
Quantity of water evaporated per pound of refuse...	1·14 lb.
Average temperature by copper wire test	2000 deg. Fah.
Average air pressure (water gauge) maintained	2½in.
Draught velocity in feet per minute	820.

Another test, of 5⅚ hours' duration, made on

[135] Report, June, 1894.

behalf of the Warrington Corporation in March, 1896, with a fair sample of Warrington refuse, gave the following results :—

Weight of refuse discharged on furnaces per hour	3173 lb.
Amount of moisture in refuse...	30 per cent.
Percentage of clinker...	15·4
Average steam pressure carried in boiler	53 lb.
Average temperature of feed-water	135 deg. Fah.
Weight of water evaporated per hour	4·766 lb.
Weight of water evaporated per pound of unscreened refuse ...	1·5 lb.
Weight of water evaporated per pound of unscreened refuse, assuming feed 212 deg.... ...	1·66 lb.
Water evaporated per pound of refuse, assuming it in dry state	2·1 lb.
Water evaporated per pound of refuse, assuming it in dry state and feed-water at 212 deg.	2·32 lb.
Temperature of flue gases ...	576 deg. Fah.
Draught in flue in inches of water	$\frac{9}{10}$in.
Draught in ashpit	2in.

(To be continued.)

THE SANITATION OF DOMESTIC BUILDINGS.

By Frank Latham, C.E., M. San. Inst., &c., Assistant Surveyor, Borough of Margate.

CHAPTER VI.

Section 1.

Internal Sanitary Fittings.

These fittings, which include water-closets, slop and other sinks, flushing cisterns, urinals, baths, and various other internal arrangements in connection with house drains, are matters on which much can be said, and mainly that the best appliances should be used, seeing that good

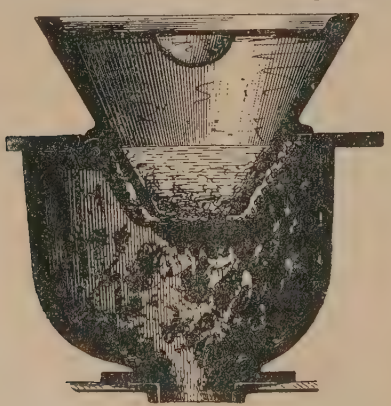


Fig. 51.

drainage is often tainted and rendered unwholesome by the use of unsuitable or inferior and unsanitary fittings. The principal of these fittings requiring attention is the water-closet apparatus, which is a trapped opening to the drains, and generally located within the dwelling; therefore should be perfect. The water-closet apparatus has taken many years to bring to its present state of cleanliness, and to ensure this condition the simpler its construction the easier it is to maintain in order. Much improvement has of late years taken place in this form of sanitary work, superseding to a great degree the old appliances.

It will be more convenient to divide the subject of water-closet construction into two sections :— Firstly, dealing with those forms of apparatus which, although insanitary and obsolete are still to be found in use (some of the better description of this class being still fixed by unscrupulous builders when opportunity occurs for so doing), and secondly, with the most suitable forms of apparatus.

By far the worst possible form of water-closet apparatus now found in use is the pan water-

Fig. 52

closet (Fig. 51). This apparatus is fitted with a copper pan having plenty of angles to hold filth, which, when the pan is not in a leaky condition, holds water in the basin. The pan upon being tipped discharges its contents into a receiver, and at the same time exposes the contents of the latter foul receptacle to the house. The receiver is a large iron receptacle, affording every facility for the deposit of sewage; this receiver generally discharges into the soil-pipe through a D trap, which is another highly-objectionable arrangement, the whole—or part, in most instances—being flushed through a fan spreader at the back. Altogether this apparatus is a combination of the most insanitary contrivances. Now-a-days, however, very few words are required in condemning this apparatus, and the Sanitary Inspector, should people insist on letting it remain, can require the occupier to occasionally remove the receiver for burning-out purposes, the annoyance and cost of doing this soon inducing the householder to get the closet replaced by a proper appliance. Furthermore, the model bye-laws of the Local Government Board prohibit its use in new buildings.

The old hopper water-closet (Fig. 52) is another insanitary contrivance. The main fault in this closet is the basin; it being conical in shape, the surfaces become filthy from top to bottom, and whether fitted with flushing rim and good flush or not it after a while becomes quite foul and objectionable. The plug or plunger closet (Fig. 53) consists of a basin, at the side of which is a chamber provided with a plug, fitting down into the mouth of the trap. This plug is intended to retain a body of water in the basin, and upon being lifted and the apparatus flushed, gives outlet to the contents of the closet. This apparatus is not a good one, there being a great deal of surface exposed to the air of the house when in action, and the plug chamber,

which is not easily accessible, becomes filthy, besides which the action of the plug is not to be relied upon, as it is very liable to lose the water flush from the leaky state of the plug, which is generally its normal condition.

The wash-out closet (Fig. 54*) is a more modern form of apparatus, the basin of which is made to retain water at the bottom by its being hollowed. The closet is not satisfactory, being rather odorous, owing to the soil not being properly immersed in water till reaching the trap, and upon

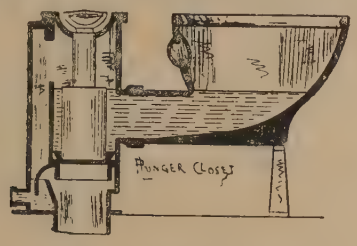


Fig. 53.

being flushed is broken up and dashed against the outlet and then into the trap, from whence it generally has a difficulty in clearing itself, and often remains there till again used.

It must not be taken for granted that a good-looking closet is a sign of its being sanitary, as some of the bad forms are well got up and highly ornamented, especially inside the basin, which is very seldom done in new forms, they being as a rule plain white.

The old custom of framed-in closets is a mistake, although some people, who have a fancy for their apparatus appearing like a piece of furniture, prefer them so done, the result being that a fœtid odour is inseparable from them. They are also frequently a screen for bad work. The author has on several occasions been called in to investigate cases of certain rooms in houses being unusually close and foul smelling, and has invariably had to attribute the cause to the use of framed-in closets, and

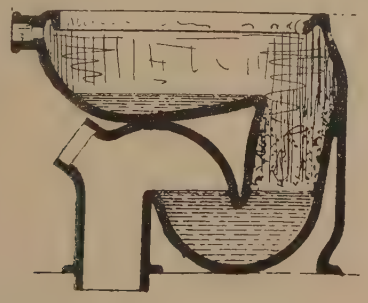


Fig. 54.

upon these being removed, and the defects remedied, the nuisance has ceased to exist. The general reason of the trouble is that the plasterer, knowing that his work near the floor will be obscured by the wood skirting, as a rule skips that portion, and the joiner following, cuts away, plugs the walls, or does not continue this skirting inside the part to be framed in, and therefore, should the enclosure be battened, or merely timber partitions, any smells from the apparatus when in use and foulness with which the floor, &c., is often saturated, or from defective joints will, ventilate up and around the hollows in the walls, and be conducted into the surrounding rooms.

The form of water-closet to be preferred is one so constructed as to give ready access to all its parts for cleansing, and to serve the three purposes of water-closet, urinal, and slop sink, thus for a certainty doing away with at least the last-named contrivance generally required in houses. It should be fitted with a balanced seat (Fig. 55) so

Fig. 55.

that the inconvenience caused from the spilling of slops may be avoided, and which, when required, can readily be put into position for use. The soil should be immediately immersed in a good volume and deep seal of water, and delivered directly into the drains without coming into contact with any exposed surfaces; there should be no sharp angles nor ridges which would collect filth or in any way interrupt the easy flow of the flush.

Difficulties in dealing with Measles. — Some difficulties in dealing with measles are cited in the report of Dr. W. J. Heslop, M.O.H. Urban District Council of Stretford. These difficulties, it appears, were due to the slight regard the general public entertains for this disease, the early stage at which it becomes infective, the lengthened period of incubation, the early age at which patients become attacked, causing difficulties in isolation, and the lengthened period of isolation required. "Our efforts to stem the epidemic," writes Dr. Heslop, "have been directed to endeavouring to confine the disease to the houses in which it occurred, by enforcing a strict quarantine on the infected house, together with the school closure, and the pointing out of the best means of disinfection to be undertaken by the parents, as it was found impossible for your Inspectors to disinfect each house, and also drawing the parents' attention to their legal responsibility in exposing infectious cases. At the commencement of the epidemic many people seemed to be unaware that measles was a notifiable disease, and although the township had been billed by posters and handbills, they seemed to have lost sight of this requirement, and it was thus that the epidemic spread so rapidly among the school children.

THE SUCCESS OF VACCINATION AND OTHER PREVENTIVE MEASURES IN SMALL-POX.

By MEREDITH YOUNG, M.D., Mast. Surg., D.P.H., Medical Officer of Health and Med. Supt. Crewe Corporation Hospitals.

(*Continued from page* 226.)

SOME interesting relations are brought out by a consideration of the condition of the once-vaccinated

TABLE I.

Number of scars.	Discrete attacks.		Confluent attacks.		Hæm. attacks.		Deaths.	
	Number.	Per cent. of total cases.	No.	Per cent. of total cases.	No.	Per cent. of total cases.	No.	Per cent. of total cases.
One scar	10	12·5	2	2·50	—	—	1	1·25
Two scars	17	21·2	1	1·25	2	2·50	1	1·25
Three scars	27	33·7	5	6·25	—	—	1	1·25
Four scars	16	20·0	—	—	—	—	—	—

TABLE II.

Area of scars.	Discrete attacks.		Confluent attacks.		Hæm. attacks.		Deaths.	
	Number.	Per cent. of total cases.	No.	Per cent. of total cases.	No.	Per cent. of total cases.	No.	Per cent. of total cases.
Under ¼ square inch	5	6·25	3	3·75	2	2·50	1	1·25
¼ to ½ square inch	44	55·00	4	5·00	—	—	2	2·50
½ square inch and over ...	21	26·25	1	1·25	—	—	—	—

TABLE III.

	Discrete attacks.		Confluent attacks.		Hæm. attacks.		Deaths.	
	No.	Per cent. of total cases.	No.	Per cent. of total cases.	No.	Per cent. of total cases.	No.	Per cent. of total cases.
Foveated scars	58	72·5	4	5·0	1	1·25	1	1·25
Unfoveated scars	12	15·0	4	5·0	1	1·25	2	2·50

class more particularly. I propose, therefore, to examine this class as to the relationship between the severity of attack and mortality at all ages, and (1) the number of vaccination cicatrices; (2) the area of scarring; (3) the condition as to foveation.

I.—*The number of Vaccination Scars.*

Exact information was obtainable with regard to 80 cases, and these may be classified in Table I.

Thus it is seen (1) that the percentage of discrete attacks is greater in persons with two scars than in those with one, and is greater in those with three scars than in those with two, whilst in those with four scars there is a decided advantage over cases with but one scar, though this does not hold good with the two and three scar cases. (2) The four scar cases, however, show a total absence of attack by the severer forms of the disease, and a total absence of deaths.

II.—Taking next the condition of the same 80 cases as regards total scar area, the particulars are as set out in Table II.

Thus the percentage of discrete attacks was large in cases with medium and large-sized scars, and the cases with the largest scar area showed the smallest percentage of confluent attacks, and a total absence of both hæmorrhagic attacks and deaths.

III.—*Foveation of Scars.*

Classifying the same cases on this basis we get the results shown in Table III.

Practically, the only safe conclusion we can draw from this is that almost three-quarters of the cases with foveated scars were discrete cases.

Taking together the number of scars and the

foveation, or otherwise, of these we have the following particulars of 78 vaccinated cases :—

Nature of scars.	Nature of attack.			Deaths
	Discrete.	Confluent.	Hæm.	
One scar foveated ...	5	2	—	1
,, unfoveated...	3	—	—	—
Two scars foveated ...	15	—	1	—
,, unfoveated...	2	1	1	1
Three scars foveated	22	2	—	—
,, unfoveated	5	3	—	1
Four scars foveated...	14	—	—	—
,, unfoveated	2	—	—	—
Total	68	8	2	3

Duration of stay in Hospital.—The evidence which this supplies on the influence of vaccination is, in this case at all events, not specially valuable. A rule was made, for example, in the early days of the hospital, that no case, however mild, should be discharged within fourteen days of admission, and this naturally lengthened the average duration of stay of the mild cases, whilst it did not affect the severe ones.

Another thing which to a considerable extent discounts the value of statistical data on this point is that, in a good many cases, a child a few weeks or a few months of age was admitted suffering from small-pox in a severe form. Owing to the fact of the child being breast-fed, or at least being too young to be separated from its mother, the latter was admitted with the child, and was re-vaccinated on admission, this being made a condition of admission.

The mother in several cases contracted a severe form of the disease, lasting perhaps for a week or ten days, but the precaution was not taken of entering her case up as having been admitted on the first day of the disease, and as having been discharged when the disease had terminated. The actual dates of admission and discharge in company with the child were entered, and therefore the duration of stay of the mother's mild case was made coincident with the child's severe case.

However, I give the averages subject to this explanation :—

	Average duration of stay in hospital.
Never-vaccinated cases	25 days
Once-vaccinated cases...	23 ,,
Re-vaccinated cases	17 ,,

The averages, it will be seen, are in favour of the once-vaccinated and re-vaccinated cases, but not to the same extent as they might have been had they been based on proper observations.

Particulars of Small-pox and Vaccination in Quarantined Persons.—During the epidemic, 83 families were kept in "quarantine" by the various Local Authorities concerned, and the statistics in regard to them give the most reliable evidence obtainable, perhaps, of the protection afforded by vaccination and re-vaccination, for the persons concerned had been exposed for, as a rule, at least two days to the infection of small-pox, and were living under the same conditions of life, &c. In the 83 families there were 277 persons at all ages. Of these 16 were unvaccinated, 78 were once vaccinated, and 183 were re-vaccinated ; and of the 277 persons 37 contracted small-pox.

Of 78 persons under 10 years of age 13 were unvaccinated, 54 were once vaccinated, 11 were re-vaccinated, and 16 contracted small-pox. Of 199 persons over 10 years of age 3 were unvaccinated, 24 were once vaccinated, 172 were re-vaccinated, and 21 contracted small-pox.

Of the 78 persons under 10 years of age, 5 once-vaccinated persons contracted small-pox, and all 5 cases were discrete and non-fatal. The incidence of attack on the once-vaccinated class was thus 9·25 per cent., and the case-mortality *nil*. Of the same 78 persons, 11, who were unvaccinated, contracted small-pox, and of these 11 cases 7 were confluent, 4 discrete, and 3 fatal. The incidence of attack on the unvaccinated class was thus 84·6 per cent., and the case mortality 23·0 per cent. Thus, the once-vaccinated persons under 10 years of age showed a more than ninefold greater immunity from attack compared with the unvaccinated when placed under the same conditions of exposure to the infection of small-pox. Of the 11 re-vaccinated cases none contracted small-pox.

Taking next the 199 persons over 10 years of age we find that of those who were once vaccinated 12 contracted small-pox, and, with the exception of 2 hæmorrhagic cases at advanced ages (43 and 59), all the attacks were discrete and non-fatal. The incidence of attack on the once-vaccinated class was thus 50 per cent., and the case-mortality 8·33 per cent. Of those who were unvaccinated all three contracted small-pox and one died, the other two having severe discrete attacks. Thus even in persons over 10 years of age, we have in the vaccinated a twofold immunity against attack, and a fourfold immunity from death by small-pox. Of 172 re-vaccinated cases 6 contracted small-pox, and in all cases the disease was discrete and non-fatal. The incidence of attack on the re-vaccinated class was thus 3·48 per cent. and the mortality *nil*. Thus the re-vaccinated class, as compared with the once-vaccinated class over 10 years of age, showed a fourteenfold immunity against attack and an eightfold immunity against death by small-pox, and, as compared with the unvaccinated class at the same age period, the re-vaccinated class showed a twenty-eightfold immunity against attack and a thirty-threefold protection against death by small-pox

(*To be continued.*)

Public Appreciation of Isolation Hospitals.—A striking testimony as to the public appreciation of isolation hospitals is reported by Mr. J. P. Humphery, Sanitary Inspector, Reigate. The number of cases removed as compared with the number notified were, removals, 103 ; notifications, 123. Of the number notified eleven occurred at St. Anne's Asylum, at which institution there is an isolation building for the treatment of such cases, and one was that of the cook at the isolation hospital. It will thus be seen that only eight cases were treated in private houses in the borough, which shows that the inhabitants are showing a growing intelligent appreciation of the benefits of having such cases removed. "It is worthy of note," adds Mr. Humphery, "that during the whole year I have not received one complaint as to the treatment of the children during their detention at the hospital, but quite the contrary has been the universal verdict."

PUBLIC HEALTH.

THERE was a good attendance at the St. Peter's Liberal Club, Arundel-street, Sheffield, on Monday, the 28th ult., when Dr. Hargreaves, one of the City Councillors for the ward, gave a lecture on "Public Health."

After a few opening remarks by the CHAIRMAN, Mr. R. Styring, who alluded to the importance of giving attention to the question of public health, and to the opportunity which Dr. Hargreaves, as a City Councillor, had of studying the question, the lecturer began with some observations on the necessity of personal attention to health. A complete system of hygiene for mankind must include consideration of the mental and moral faculties as well as the organs of the physical nature in a regular balanced order. The mental and moral faculties had great influence over the body, and the body had great influence in regulating them. He pointed out that there were four periods of life, to each of which general principles of health could be applied. Speaking on the first of these periods—infancy—he remarked that the average death-rate of children under the age of one year in Sheffield was 170 per 1000, and throughout the country it was 150. He dwelt on the need there was that the education of youth should include some teaching as to the laws of health. In adults, the whole of the powers, mental and physical, should be exercised, and life would be all the happier for it. A necessary precaution during this period was temperance—a sufficiency for health, but not indulgence. In old age, when the prime necessity was warmth, wine, or a little spirit might be permissible, but for healthy men at the adult period it was not a necessity. Going on to speak of legislation for the public health, he said it had been almost wholly confined to the Victorian era. With the exception of the Act with regard to the plague in 1603, the first legislation was in 1832, for protection against cholera, and this was followed by the Act relating to small-pox in 1840. He proceeded to describe the working of the various subsequent Acts, the first Public Health Act of 1848, the Local Government Act of 1858, the next Public Health Act of 1872, &c. He showed how, under these Acts, the pollution of rivers, the sanitation of dwelling-houses, the suppression of nuisances, and offensive trades, the notification of infectious diseases, and other matters were attended to. It was a curious fact that under the provisions with respect to offensive trades, the business of a rag and bone merchant could be dealt with, but no action could be taken in the case of private brick burning or the keeping of fried fish shops, though more nuisance might be caused by these trades than by the former. The West-street Hospital, he also mentioned, was not now the object of so much aversion from the inhabitants as when it was erected. They at first thought that by using the hospital they would be pauperised, but they had been educated beyond that, and instead of pressure being required to induce patients to go, it was the patients who complained that they could not be admitted. In 1890, 17 per cent. of the scarlet fever cases notified were admitted into the hospital; in 1896 the percentage was 59, and the percentage of enteric fever cases treated increased in the same time from 15 to 54. The present accommodation at West-street was very inadequate. There were 200 beds, and, calculated on the basis of one bed for every 1000 of the population, there ought to be 350; but even this provision would not be sufficient in the case of an epidemic. The lecturer was heartily thanked at the close.

Reviews.

Sewer Gas and its Influence upon Health. By H. ALFRED ROECHLING, C.E. Published by Messrs. Biggs and Co. Price 5s.

IT has long been known that emanations from sewers have a very powerful predisposing influence to many zymotic diseases, and, furthermore, although there is abundant experimental proof, in the case of animals, of the pernicious action of sewer gas upon health, yet the question has received upon the whole but scant attention from the hands of sanitarians.

A great deal has been written at one time and another with reference to the question of the influence of sewer gas upon health, but the published information has dealt invariably only with one or two aspects of this question, and not with the whole. This state of affairs the author has endeavoured to remedy in the treatise before us, and although he is fully aware that great gaps still exist in our knowledge of the subject, he has succeeded in throwing a great deal of light upon many obscure points. As pointed out by the author in his preface, the ultimate elucidation of this question must not be looked for from one standpoint only but from several, and it is to the harmonious working together of several specialists, such as the chemist, medical practitioner, bacteriologist, and engineer, that the answer must be looked for as to the sanitary bearings of this important subject.

The book contains chapters upon the history of the sewer-gas controversy, the present state of our knowledge respecting the chemistry of, and the changes fæcal matters undergo after evacuation, the composition of sewer gas, the bacteriology of sewer air, &c., and, although the knowledge displayed upon some of these points is of a somewhat superficial character, perhaps it is, on the whole, sufficient for the general illustration of the points connected with the points at issue.

In the second portion of the work the author deals with the experimental researches that have been published by various workers upon the subject, and he gives a very complete list of the home and foreign literature upon the influence of sewer air upon health.

In addition to a very full account of the evidence of the casual relations of sewer gas to typhoid fever and other diseases, a large number of authentic cases of mephitic and septic poisoning are given as the result of the action of sewer gas.

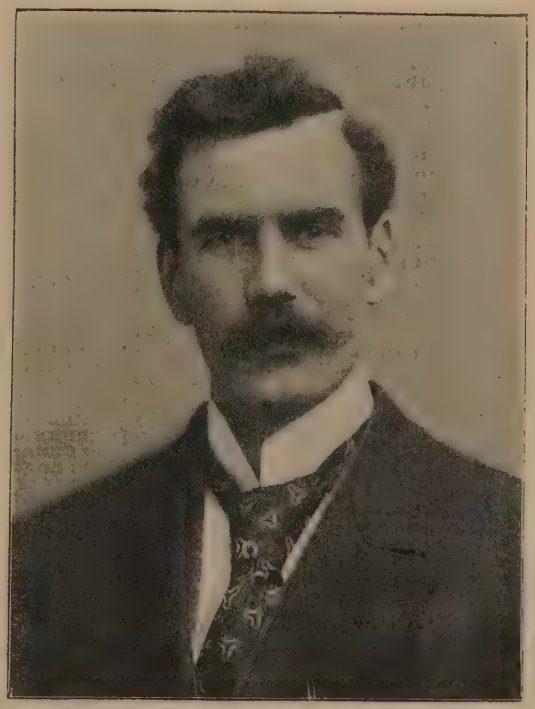
The author of this work deserves the thanks of all who are interested in the health of the community for the lucid manner in which he has collected and epitomised the whole of the information and evidence bearing upon the subject of the influence of sewer air upon health, and the book is one which should be studied by every student of sanitary science.

Coming Municipal Men.

I.—MR. FRANK LATHAM,

Assistant Surveyor, Margate.

MR. FRANK LATHAM, who is contributing a series of articles to this journal, is son of Mr. Albert Latham, M. Inst. C.E., Borough Engineer of Margate, and nephew of Mr. Baldwin Latham, M. Inst. C.E., of Westminster. He was born in Croydon, and educated at Margate College, and afterwards Thanet College. He served his articles as civil engineer and architect in the Borough Engineer and Surveyor's office, Margate, during which period he was admitted student of the Inst. C.E. Soon after completing his pupilage he started in Margate as Architect and Surveyor and Sanitary Engineer, and assisted generally in his father's private practice, during which time he made much progress, and was awarded an honorarium by the Margate Town Council for special sanitary work, reference being made by the Mayor and others (*Keble's Gazette*) of the admirable manner in which he had discharged his duties. He had on more than one occasion during this period charge of the surveyor's department in the absence of the Borough Engineer. He was awarded the certificate of competency in sanitary knowledge of the Sanitary Institute, and elected member in 1894, since which he has become Fellow of the Institute of Architects and Surveyors, and connected with other societies. In the following year he was appointed by the Town Council as Assistant Borough Surveyor of Margate out of 101 candidates, his duties being to examine plans for new buildings, and inspect the work when proceeding, and the same with the drainage of buildings with the new sewers, to attend and report to committee meetings, to be responsible for the correctness of the wages sheets, to conduct the correspondence of the surveyor's department, and to generally assist in the public works of the borough.



MR. FRANK LATHAM.

Mr. Latham has spent eight years in the offices at Margate, during which time he has been engaged in drainage works (the main scheme carried out by Mr. Baldwin Latham, and costing upwards of £80,000), house connections, about 3500, public promenades and conveniences, town improvements, road maintenance, sea defence works, waterworks and sewage pumping machinery (20 pumps, &c., in all), supervision of buildings and repairing of streets under the compulsory powers of the Private Street Works Act, and the usual routine of the public offices of this popular and progressive watering place.

The surveyor's department at Margate is always more or less full up with business. Amongst the principal public works now in hand are:—The building of new municipal offices; the laying out and constructing of roads and sewers, together with the erection of caretaker's cottage and lavatories in the new park; the sewering and raising of Dane and other roads; the reconstruction of sea defences damaged by the recent storm, and the preparation of a scheme for new sea wall at Cliftonville; the extension of the waterworks by a deep bore to a depth of 850ft.; and the design and construction of a high-level reservoir tank of capacity of 250,000 gallons; the overhauling and repairing of two Worthington pumps in connection with the sewerage system. A scheme for doing away with drain for Marine Drive houses, and connecting the properties with the High-street sewer; surveys and scheme, recently completed, for connecting sewer between Margate and Westgate. Surveys and plans for putting into repair, and taking over several private streets just finished, and others in hand; three new shelter seats being erected on the Queen's Promenade, &c. Besides this batch, the repair of roads is in full swing, and the tarring of paths and borough painting is about to commence. There have also, each year for three years, been about 250 plans for building operations submitted for approval, and about 200 new domestic buildings, together with a large number of additions to existing premises have been erected yearly. House drainage work is also regularly going on, and testing and connections with the public sewers are done daily by the Surveyor's department.

The Assistant Surveyor has, as stated in the *Thanet Times*, "evidently given the subject of sanitation much thought, and had some rather startling experiences," he having, besides his home training, spent considerable time in London and elsewhere on the matter.

Mr. Latham has a good knowledge of shorthand writing, which has been of much use to him, having obtained Pitman's proficiency certificate for a speed

of 120 words per minute. Some of his drawings have had good notice, his work being accepted by the South Kensington Educational Department for Art Masters' Certficate, and much credit is due to him for his designs in iron work. He also, besides his professional energies, assists as an instrumentalist at entertainments, and takes a leading interest in sports. He further devotes much time to his Masonic duties.

Mr. Latham has altogether, during his professional career, had an active life, and Mr. Leach Lewis, J.P., writing of his old pupil from Margate College, London offices, says that he certainly possesses indomitable pluck and perseverance.

Sanitary Inspectors' Associations.

LONDON.

AN ordinary monthly meeting of the Sanitary Inspectors' Association was held on Saturday at the Carpenters' Hall, London Wall, E.C. Mr. T. G. Dee (Westminster), the chairman of the Council, presided, and among those present were Messrs. H. Alexander, C. W. Raymond (hon. treasurer), S. G. Fairchild, J. F. Skinner, Ashdown, S. C. Legg, Henley, Barth, I. Young, W. H. Grigg, Jordan, Potter, Duck, McNair, and Mr. E. Tidman, C.E., the hon. secretary.

A number of members were elected, and in reply to Mr. Legg,

Mr. TIDMAN stated that the representations of the Association to the London County Council with respect to the low salaries proposed to be paid by the Vestries of Hackney and Battersea to Sanitary Inspectors they were about to appoint had not been altogether fruitless. The Public Health Committee of the London County Council had reported, recommending the Council to make representations to the Local Government Board as to the inadequacy of the suggested salaries, but upon the report coming up, Dr. Forman, the chairman of the Public Health Committee, had withdrawn the report, stating that it was hoped to attain their object in another way.

After some discussion, the secretary was requested to again communicate with the London County Council upon fresh aspects of the subject.

Mr. J. F. SKINNER read a paper upon "The Inspection of Dairy Farms." He said this was a matter of vital importance to large towns and cities, first with regard to the purity and freedom of contamination of the milk supplied; and, secondly, the wholesomeness of the flesh of the animals obtained from the farms and sold for consumption in large towns. At present the inspection of dairy farms was carried out in a most unsatisfactory manner, and in many instances it amounted to no inspection at all. In many rural districts the Sanitary Inspector was a poorly-paid official who only devoted a portion of his time to the duties of his office, and had a district so large that it was impossible for one man to properly do the work. In most cases the only inspection was made by the police, who occasionally visited them in order to ascertain if there were any animals suffering from contagious disease, but made no inspection as to the sanitary condition of the premises, or made any inquiries as to whether any of the employés were suffering from infectious disease. The milk was sent to the nearest town, and i was without guarantee of any kind. If there was proper supervision the country was the best place for dairy farms, and he thought the Sanitary Authority of every large town should be empowered to send their officers to inspect all dairy farms from which milk is sent into their district. If disease or insanitary conditions were discovered, then the Authority should have power to prohibit milk from that source being brought into the town. This would be a drastic measure, but until some such step is taken the inspection of dairy farms would never be properly carried out. The Infectious Diseases Prevention Act, 1890, was a step in the right direction, but it had two serious objections, viz., it was permissive, depending on the adoption by the Local Authority; and, secondly, by Section 4, the Medical Officer was empowered in certain cases to inspect dairy farms from which milk is sent into his district, but so many difficulties arose in putting the section in force that it was practically valueless. In fact, the Medical Officer must be in possession of evidence that some person in his district is suffering from infectious disease attributable to the milk supplied from a dairy without the district before he could exercise the powers conferred by the section. A more striking illustration of locking the stable door after the horse is stolen is seldom seen. Even when the inspection was made and evidence obtained more delay occurred. By the Dairies, Cowsheds, and Milkshops Order of 1885, various regulations were laid down, and these Mr. Skinner examined at length, afterwards drawing a vivid picture of the insanitary condition both as regards water supply, cleanliness, &c., of many dairy farm buildings in which cows are kept for the purpose of providing a milk supply. He referred to the milk stores and vessels, and gave a number of useful hints in regard to their inspection, and what should be required. He next dealt with the various contagious diseases from which cows suffer, and showed how these could be detected; and urged the keeping of a register of the whole animals kept for dairy purposes, as by this means a history of each cow could be kept.

Mr. S. G. FAIRCHILD moved a vote of thanks to Mr. Skinner, and referred to the difficulties of securing removal of infected persons from dairies, owing to the lack of accommodation at the Metropolitan Asylums Board hospitals. He thought the Board should be made to keep beds specially for these urgent cases. He also condemned the practice of mixing milks, as by this means a greater number of people were endangered.

Mr. I. YOUNG seconded the vote of thanks, and said if what Mr. Skinner had said was true in regard to the condition of dairy farms, the sooner all cows were kept in London the better.

Mr. SAUNDERS remarked that from his personal knowledge he thought the picture was under rather than overdrawn.

Mr. GRIGG reminded the members that in Belgium it was the universal practice to mix all milk together, and the small amount of scarlet fever and diphtheria in large towns like Antwerp seemed to show there was no particular danger in this practice.

Other members having spoken,

The CHAIRMAN said the fact that the Sanitary

Inspector in rural districts was a poorly-paid official, with much more work than one man could possibly get through, however anxious he might be to do his duty, was one explanation of the existing state of things. If there was sufficient inspection by officers who had permanent tenure of office, and need not fear anything from the members of the Local Authority, much of the evil would be removed.

The motion was heartily carried, and

Mr. SKINNER, in answering some of the points raised, pointed out that in rural places there was no isolation hospitals to which employés on farms could be taken when they fell ill from infectious disease. The fact that the Local Authorities entrusted with the administration of the law were composed of the farmers who sent the milk to market was a serious drawback to any effort to bring about improvement.

The usual private conference was then held, and the proceedings terminated.

SOUTH WALES AND MONMOUTHSHIRE.

A SPECIAL meeting of this branch was held in the Town Hall, Cardiff, on Saturday, March 5th. In the absence of the president (Dr. Williams, Medical Officer for the county of Glamorgan), who is indisposed, Dr. Walford, Cardiff, presided, there being a large attendance of officers and ordinary members. At the outset a vote of sympathy with the president in his illness was passed. A considerable number of gentlemen in Glamorganshire and Monmouthshire were nominated for election as hon. members, ordinary members, and associate members. Mr. John Powell, Surveyor and Sanitary Inspector, Pontypool, was elected a member; Messrs. Llewellyn Davies (Swansea) and T. Warren (Cardiff) were nominated as scrutineers for the ensuing year; and Messrs. Alfred Edgar Leyshon (Barry) and D. J. John (Pontypridd) were nominated as auditors. The meeting then discussed the Sanitary Inspectors' Superannuation Bill, 1898. A resolution was passed adopting the Bill, and deputations were appointed to interview all members of Parliament within the area of the Association with the view of getting them to support the measure. The president, treasurer, and secretary were appointed to proceed to London on the day when the Bill would be introduced into Parliament and interview the various members referred to so as to secure their votes in favour of the Bill.

DEVONPORT.—Since last week, when two lads were sent to the Royal Naval Hospital, no fresh cases either of measles or mumps have developed on the training ship Impregnable at Devonport, and it is hoped the outbreak has now been effectually checked. The outbreak of measles has not been confined to the boys, as about a dozen men of the Royal Marines serving in the Impregnable have been sent to the hospital suffering from the same malady. The Circe, tender to the Impregnable, although berthed at separate moorings about 300 yards distant, is also affected with both measles and mumps. On board both ships the boys are assembled every morning on the upper deck, and are separately inspected by one of the Medical Officers, and as a further precaution all newly-entered lads for the Devonport Division are being sent to the training ship Ganges at Falmouth, which fortunately is rarely visited by an epidemic.

Institute of Sanitary Engineers

A GENERAL meeting of the members of this Association was held at the Arbitration Rooms, Chancery-lane, March 3rd. The President, Mr. Spinks, occupied the chair. Mr. F. W. Lockwood, the lecturer, was unable to be present, and the paper was read by the chairman as follows :—

THE SANITARY ADMINISTRATION OF BELFAST.

Before dealing with the Sanitary administration of Belfast it may be well to describe in a very brief and general manner the leading features of that city.

Belfast is situated at the upper termination of the bay or Lough of the same name, and lies in a hollow surrounded on the west and north by hills ranging from 1000ft. to over 1500ft. above the sea, and by other hills on the south and south-east of three to four hundred feet in height. Upon the south-west is a wide, open valley of no great elevation, and upon the north-east and east lies the sea. About one-third of the town, including most of the older portion, is built upon an alluvial plain of estuarine mud and sand, through which runs the tidal river Lagan, and this plain scarcely rises in any part much above the extreme high-water level, and in some portions is even below it. The remainder of the town extends to a height of one or two hundred feet up the slopes upon the north and west. Several small mountain streams run through the city to fall into the Lagan, one of which, the Blackstaff, is of a tidal character during the greater part of its course through the city. The upper end of the Lough is covered, and was still more so until many of them were reclaimed, with mud banks left bare at low water. The average range of the tide is not great, being from about 8ft. to 11ft. The present quay and docks, the two great shipbuilding works, supporting between them a population of nearly 50,000, and many other large establishments are all built upon sites reclaimed from the tide. Until about ten years ago the town was drained direct into the Lagan, discharging at some ten or more outlets along its course, and these were necessarily blocked by the tide for a good many hours out of the twenty-four. When exceptionally high tide occurred, especially if combined with a heavy rainfall, the contents of the sewers in the lower part of the town were forced up through the street gullies, and in many instances into the yards and basements of houses, and as most of the houses in this low part were old and the house drains of old-fashioned brick construction, this damming back must unquestionably have produced a serious pollution of the subsoil and underground air beneath the buildings. It is needless to say that the Lagan had also become very foul.

The main drainage scheme, which is practically now completed, may be divided into two, or more correctly three, sections. The first, or high-level system, may be described as forming a rough semi-circle following the line of the base or escarpment of the rising ground, and probably draining about half the area of the town, and flows by gravitation

to a point at the north-east of the town, not far from the Northern Counties Railway Station. Here it is joined by the low-level system, which runs not far from and parallel to the course of the Lagan.

The drainage of the large area which lies upon the right bank of the Lagan is brought across under the river by a syphon, and joins into the low-level sewer at about the middle of its course. This combined low-level drainage is then pumped up into the high-level sewer, and the whole runs on by gravitation to a station formed in the mud banks near the edge of the Lough. Here it is received into a covered four-acre tank, so as to retain it during the time of high water, and to discharge it only after the turn of the tide, the discharge being stopped about two hours before low water. To further ensure its safe disposal it flows for another 1800 yards through a wooden shoot formed in the mud, and which terminates in the Pool of Garmoyle, a basin about two miles wide of comparatively deep water, at a distance of about four miles from the centre of the town. In connection with the tank an auxiliary pumping station has been provided to more rapidly empty the tank in the event of heavy rain floods. The low-level sewer being deep, and kept clear by pumping, has allowed of the shallow and defective street sewers in the older parts of the town to be relaid at an increased depth, and by this means the flooding of these parts and the saturation of the sub-soil has been to a great extent put an end to. This work is still going forward, and it will be some time yet before all the old sewers are deepened.

At the time the main drainage scheme was before Parliament the present writer, in a short review of it, raised a note of caution as to the possibility of detriment to the foreshores of the Lough from the discharge of so large an amount of drainage into a comparatively limited area, and the matter being taken up in more influential quarters, several measures of precaution, including the 1800 yards wooden shoot, were, during the carrying out of the scheme, adopted. Nevertheless, although the main stream of the river has, as might well be expected, become very much improved in purity, a cry has from time to time been raised that the injury feared to the foreshores has already taken place. It is not easy to judge whether there is any real ground for these complaints. The slob lands were unpleasant at certain times before, and remain so still, but I doubt whether they are really any worse than they were ten years ago. The City Surveyor, however, J. C. Bretland, Esq., M.I.C.E., in his report at that time recommending the scheme, pointed to the possibility at some future time of adopting some method of at least partial purification, and indicated that ample space would be available in the vicinity of the tank and could be reclaimed for such a purpose. It is quite conceivable that with the rapid progress which the bacterial system, for instance, is making in public favour, that a few years may see the attempt to dispose of the grosser impurities by a rapid biological action before the sewerage is discharged into the sea.

There is another point with regard to the discharge of the sewage here. Thirty, and even twenty years ago, a very large quantity of the coarser shell-fish, mussels, cockles, and periwinkles, were gathered from these various banks and foreshores. As an eminent zoologist, Mr. R. L. Patterson, F.L.S., several years ago pointed out, so large a number of mussels were sent over as bait for the Scottish fishermen, that they nearly became extinct, but recently, after the trade ceased, as being no longer profitable, they have begun to increase again, and will doubtless once more be appropriated as food for the masses. It is well known that many cases of typhoid have been traced to sewage-contaminated oysters, and mussels and cockles must be quite as capable, under similar circumstances, of spreading the infection. These remarks are in no way intended as condemnation of the main drainage system, but simply as minor considerations which may yet call for future attention.

In treating of the sanitary administration of Belfast, it must first be explained that the city government is to some extent in a transitional state, on account of the very large addition which has recently been made to the city area.

The municipal boundaries, which were in the year 1885 fixed so far in the country as to allow of a very great extension in every direction, have nevertheless by the rapid growth of the town been so much encroached upon, and various outlying suburbs and villages have become of such importance as to render a very large extension of the city area imperative, and this came into effect in November, 1897. Before then the city area was about 8474 acres, it has now been increased to about 16,503 acres. This, of course, will involve a considerable increase in the staff of Inspectors and other officials, and will also, especially at first, bring some districts, at present—at least in part—of a rural character, under the city administration.

The sanitary work of a large city such as Belfast may be divided in the main between two great departments. Owing to the very rapid extension of the city, the first of these, administered by the City Surveyor and his staff, under the control of the Improvement Committee of the City Council, has been of even greater extent and importance than in most towns, and may be said to be devoted to construction, and has to do with the regulation of all new roads and buildings. The second, or Public Health Department, directed by the Medical Officer of Health and the executive sanitary officer, may, in contradistinction to the former, be said to be devoted to destruction, or the searching out and abolition of nuisances. Possibly a better way of putting it might be to say, that the duty of the former is prevention, and that of the latter cure.

The City Surveyor's department has, however, had a great deal to do in the way of destruction, by sweeping away slums and opening out congested areas, and there is no reason to suppose this work is yet at an end. They have also erected four extensive and admirably-appointed suites of public baths, and are now projecting a fifth.

The regulations for the erection of new buildings are very complete, and the chief points in which they more particularly bear upon sanitary matters may here be briefly summarised. Omitting all those provisions which deal with such questions merely as strength and statistical safety, I number the various items for convenience.

(1) All new buildings must be of good materials, and especially mortar. The exact standard does not appear to be defined, and much is clearly left to the knowledge and discretion of the officials.

(2) No made ground is to be allowed; or at least if in the opinion of the officer it is bad, it is to be removed, and in other cases covered with

asphalt, concrete, or similar damp-resisting material. This regulation has led to much controversy, not certainly as to whether it is a proper one—upon that there is no doubt—but as to whether it has been properly enforced. I shall certainly not repeat the charges that have been freely made in certain quarters as to connivance at the violation of this rule. The most honest officials, after all, are only human, and may not always be able to overtake their work, and may sometimes be caught napping. There is no doubt, however, that in very recent years a very large quantity of road sweepings, most of it we will suppose of a harmless nature, has been used to fill up hollow and swampy ground, and with this, owing presumably to a want of a sufficiently vigilant inspection, a large quantity of refuse from other quarters has been, quite contrary to the regulations, put down—enough often to render the whole mass most objectionable, and through this deposit several streets have been cut. I believe that up to the present the Improvement Committee have succeeded in preventing houses from being erected upon the worst of these spots, but I fear that in many less conspicuous instances they have not enforced their own bye-laws as strictly as could have been wished, or as in the interest of the public health was desirable. I may have to refer to this topic later on.

(3) There are strict rules as to suitable construction, as to preventing damp rising from below, or getting into walls through the roof or spouting, &c.

(4) Every apartment occupied as a dwelling, or in which persons regularly work, is to be of reasonable size, and no ceiling is to be less than 8ft. in height.

(5) Every apartment is to have some means of ventilation, either by open fire-place, or, failing that, a ventilator in the outer wall of each room, and a window made to open at the top. These last two provisions are no doubt excellent, but in an artisan population which delights in stuffiness are practically a dead letter, as there is nothing to hinder, as is usually the case, the ventilator being pasted over the moment the house is occupied, and the regular opening of windows is not, and hardly could be, made compulsory.

(6) No drain is to pass under a dwelling, except by special leave in exceptional cases, when it must be an iron pipe surrounded by concrete. This rule is very strictly enforced. All drains everywhere must be inspected before being covered up. I do not think, however, this inspection is quite so rigid as it might be—at least, for instance, in not always applying the water test. The tendency is, however, to greater care, which comes with increased knowledge and experience on the part of the Inspectors.

(7) All traps must be of the modern sort, and to every house (now modified under certain conditions as to ventilation and inspection to include a row) must be a disconnecting trap of Buchan's type.

(8) Soil pipes must always be outside and of full 4in. diameter, carried up the same width to a proper height above eaves.

(9) All wastes must be outside and discharge over gullies 18in. from wall.

(10) All water-closets must be in outside wall, and ventilated.

(11) Must have separate flushing cisterns, and the type of water-closet must be approved of.

(To be continued.)

General News.

HOME.

NOTICE.—On and after 31st March next the Annual Subscription to this Journal will be raised to 12s. 6d. to all NEW Subscribers. NO ADVANCE will be made to our friends whose names are entered on our Subcription list prior to that date, so long as they continue to Subscribe.

BRAMLEY.—The Guardians have decided upon seeking a loan for £1000 for the furnishing of the new hospital.

MALDON.—Plans for the proposed infectious diseases hospital, the building of which will cost from £950 to £1000, have been approved provisionally.

CLEWER.—The Local Government Board propose to hold, on March 15th, an inquiry into the matter of obtaining by compulsory powers a piece of land at Clewer for the purpose of erecting a pumping station.

COLERAINE.—A Local Government Board inquiry has been held concerning the application of the Town Commissioners for sanction to a loan of £5000 for the purpose of providing an additional water supply for the township.

KIRKBY STEPHEN.—A Local Government Board inquiry has been held at Kirkby Stephen into the application of the East Westmorland District Council for sanction to borrow £700 for purposes of water supply for the township of Kirkby Stephen.

MIDDLESBROUGH.—Dr. Malcolmson, Medical Officer of Health for Middlesbrough, died suddenly on Tuesday, the 1st inst. The increasing smallpox in the town had produced overwork and worry, which quite undermined his health. The victims to the epidemic now number 685.

CREWE.—On account of a serious outbreak of measles, several schools have had to be closed. A joint meeting of the Health Committee of the Town Council and the Schools Attendance Committee was held recently, and it was decided to close St. Barnabas' Infants' School and Pedley-street School for three weeks at least.

CARDIFF.—At a meeting of the Health Committee of the Cardiff Corporation held on February 22nd, the plans were inspected and afterwards passed for the extension of the sanatorium. Three pavilions will be erected, and there will be accommodation for sixty extra beds, making a total of 132 beds for the sanatorium. The cost is estimated at £24,000.

ROWLEY.—At the last meeting of the District Council a letter was received from the Local Government Board, stating that it demurred to sanctioning the desired loan for house connections until the scheme was amended by the addition of ventilating shafts, inspection chambers, lampholes, &c., but after being informed that the part of the drainage for which the loan was required did not need these things, it gave its sanction to a loan of £10,000 for that part of the house drains which the Council decided upon.

COCKERMOUTH.—A Committee of the Cockermouth, the Rural, and the Workington Authorities has been appointed to arrange for an increased water supply.

ERDINGTON.—At a recent meeting of the Council, the Health Committee reported that it had carefully considered the question of the cost of scavenging the district, and recommended that three tip wagons be provided at a cost of £150. With hire of team and manual labour it was stated the total cost would be about £800 for the first year.

EAST ASHFORD.—In reply to the Guardians, the Local Government Board states that it is part of the duty of Medical Officers of Health to make themselves acquainted with the character of the water supply of their districts, as one portion of their responsibility in informing themselves of all the influences likely to affect the public health. The Guardians have contended that Medical Officers should analyse samples of water when required to do so.

MAIDSTONE.—The Lord Mayor of London has remitted to the Mayor of Maidstone £927 8s. 9d., being the balance of the fund recently raised at the Mansion House for the relief of the sufferers by the typhoid epidemic at Maidstone. The Mansion House fund is now closed, but the Mayor's fund at Maidstone still remains open, as the widows' and orphans' branch of it requires to be largely augmented before adequate provision is made for these sufferers.

ST. ANDREWS, FIFE.—The Sanitary Committee have consulted Mr. Walter Brenan, C.E., Oban, engineer to the County Council of Argyll, as to the disposal of the sewage of the town. Reports and plans have been presented, with estimate of cost for dealing with same by an intercepting tank and pumping of the low-level sewers. The Town Council have agreed to delay proceeding with same to allow of an experiment on the tidal outfall pipe with an "interceptor" proposed by one of the Councillors.

FALMOUTH.—Dr. W. K. Bullmore, the Medical Officer for Falmouth and Truro Port Sanitary Authority, in his annual report for 1897, states that 791 ships, representing an aggregate of 425,372 tons, visited the port. There had not been any infectious or contagious disease brought into the district, and there was comparatively very little sickness amongst the crews of vessels arriving. The total number of cases treated during the year at the Royal Cornwall Sailors' Home was sixty-two, of whom ten suffered from accidents and injuries, ten from scurvy, one from fever, fifteen from beri-beri, and twenty-four from minor ailments.

HANDSWORTH.—A few figures contained in the Medical Officer's report have a strong bearing on the not infrequently expressed belief that Handsworth is not healthy. In the twenty years from 1871 to 1891 the population increased from 14,947 to 32,756, and at the present time it is computed to stand at 41,600. During the same period, and, be it noted, along with the increase of population, has gone a decrease in the death-rate, which was 15·9 per 1000 in the five years 1871—75, and fell gradually during each succeeding five years to 12·2 at the end of 1895. During 1896 it went up to 13·4, but during last year it fell to 12·1, the lowest for more than a quarter of a century.

EDINBURGH.—The Edinburgh Authorities, who have been experimenting with the Reeves system for preventing sewer gas on the water of Leith purification sewer for several months past, have now decided to order an extended installation of fifty apparatus.

CLACKMANNAN.—At a special meeting of the County Council held recently at Alloa, it was agreed to authorise a loan of £20,000 from the Local Government Loan Commissioners in connection with the county's new water scheme. Subsequently the Standing Joint Committee met and confirmed the resolution of the County Council.

LOCH KATRINE.—The monthly report on the quality of Loch Katrine water, prepared by Professor E. J. Mills, D.Sc., F.R.S., Glasgow and West of Scotland Technical College, has been issued. The results are returned in parts per 100,000:—Total solid impurity, 3·16; organic carbon, 0·170; organic nitrogen, 0·024; nitric nitrogen, 0·002; ammonia, 0·000; total combined nitrogen, 0·026; chlorine, 0·74; hardness, 1·27; temperature, 6·0 deg. Cent. = 42·8 deg. Fah. The water was sampled on Februrary 15th. It was light brown in colour, and contained a little suspended matter.

ABROAD.

JOHNNESBURG.—The sanitary condition of Johannesburg evidently requires the prompt attention of the new Town Council, for we notice that the death-rate for January last, amongst the white population of 50,000, reached the excessively high figure of 44 per 1000. The endeavours now being made to establish a destructor are made none too soon, but the spirit that sometimes prevails in this country with regard to these modern Gehennas, and which now is rampant at Scarborough, seems also to exist in the Transvaal, for when the decision of the Town Council with regard to a site was submitted to a town's meeting it was rejected, and a poll has been demanded. Lengthy letters containing all manner of suggestions appear in the local Press—a custom, too, which isnot unknown in this country. It seems to us another raid is required, but not upon the "oof bird" this time, but upon the deadly microbe and the undertaker.

Personal.

MR. J. F. FREW has been appointed Medical Officer for the sixth district of Oldham union.

MR. F. W. MARTIN has been appointed Medical Superintendent of the Brighouse Joint Hospital.

MR. J. R. HATFIELD has been appointed Medical Officer of Health for the rural district of Cherbury.

MR. J. M. COATES has been appointed Vaccination Officer for the Stanway district of Lexden and Winstree union.

G. A. BRANSON, L.R.C.P., has been appointed a Public Vaccinator at Bendigo, Victoria, Australia, vice Mr. J. Amess, resigned.

DR. H. M'KAY has been appointed Medical Officer for the south-east district of Sheffield union, in room of Dr. Strickland, resigned, at a salary of £75 per annum.

DR. BROSTER has been reappointed Medical Officer of Health for the urban district of Wirksworth.

O. B. TRUMPER, M.B., Ch.B. (Vict.) has been reappointed Medical Officer for the Market Rasen urban district.

DR. DEVEREUX has been appointed Medical Officer for the Tewkesbury district at a salary of £80 per annum.

J. G. E. COLBY, M.B., L.R.C.P., has been reappointed Medical Officer of Health for the rural district of Norton.

MR. S. PROTHEROE has been appointed Inspector of Nuisances for Hereford, at a salary of £150 per annum.

H. L. THURNELL, L.R.C.P., M.R.C.S., has been reappointed Medical Officer of Health for the borough of Gravesend.

GREGORY SPROTT, M.B., B.Ch. (Glasg.), has been appointed Officer of Health for the district of Queenborough, Tasmania.

J. F. HOLDEN, M.B., C.M. (Edin.), has been appointed Medical Officer for the fourth sanitary district of the Preston union.

S. T. TAYLOR, M.B. (Lond.), L.R.C.P., M.R.C.S., has been reappointed Medical Officer for the Chingford urban district.

S. ANDREWS, L.R.C.P., M.R.C.S., has been reappointed Medical Officer for the second sanitary district of the Basingstoke union.

DR. M'CALL, of Conisbro', has resigned his appointment as Medical Officer to the Cadeby portion of the Denaby Main Collieries.

MR. E. V. PERRY, of Reepham, has been appointed Medical Officer for the Witchingham district of St. Faith union, in room of Dr. H. H. Back.

MR. HENRY SIMMONS, Corporation gas manager, Colne, has been appointed manager of Bury Gasworks, at a commencing salary of £350 per annum.

THE Local Government Board has sanctioned the appointment of Dr. Robert Browne as Medical Superintendent Officer of Health for the township of Rathmines, at a salary of £50 a year.

W. EVELYN JAMES, L.R.C.P. (Lond.), M.R.C.S., has been appointed Medical Officer and Public Vaccinator for the parish of Mynyddislwyn by the Newport (Mon.) Board of Guardians.

MR. PATRICK O'NEILL, formerly manager of Lockerbie Corporation Gasworks, has been appointed by the directors of Lochmaben Gas Company manager of the gasworks in that burgh.

DR. HUNTON has been appointed Medical Officer of Health for Sedgefield, in room of Dr. Sheraton, who has held the position to the entire satisfaction of the Guardians since 1864. Dr. Hunton had been Medical Officer for the Stockton union for some time.

AT the last meeting of the Sutton (Surrey) Urban District Council it was unanimously resolved to apply to the Local Government Board for a loan for the construction of additional bacteria filters, on the plans prepared by the Engineer and Surveyor to the Council, Mr. C. Chambers Smith, and of sufficient capacity to treat the whole of the daily sewage flow.

Sewerage Schemes.

[TO MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

MR. E. W. IVES, C.E., of Derby, has been retained by the Donnington District Council to prepare a scheme of drainage and sewage disposal.

A LOCAL Government Board inquiry has been held at Bradford-on-Avon into the alleged default of the Urban Council to provide the district with sufficient sewers.

THE Stratton District Council has appointed the Sanitary Inspector (Mr. R. Peardon) as clerk of the works in the new scheme for the disposal of Stratton sewage, which will be carried out by Mr. Ross Heard, of Bude.

A LOCAL Government Board inquiry has been held at West Bromwich concerning the application of the Town Council for sanction to apply £3500 of the balance of a loan raised by it for works of sewerage and sewage disposal in defraying the cost of certain works of sewage disposal.

A LOCAL Government Board inquiry has been held at Pembury with reference to a petition requesting the Board to issue a Provisional Order empowering the Tonbridge Rural Council to put in force the Land Clauses Act in order to acquire certain land for the purpose of a sewerage scheme for Pembury.

AT a recent meeting of the Yeadon District Council, a resolution passed some time ago adopting Adams's lift for dealing with the New Scarborough sewage was rescinded, and a further motion was passed accepting an offer from the Guiseley Council to take the sewage into its disposal works, the agreement to be subject to the approval of the Local Government Board.

A LOCAL Government Board inquiry has been held at Fenny Stratford into the application of the Urban District Council for the issue of a Provisional Order to empower it to put in force, with reference to certain lands required for the disposal of the sewage of the district, the power of the Lands Clauses Acts with respect to the purchase and taking of lands otherwise than by agreement.

AT the last meeting of the Hereford Town Council the Sanitary Committee reported a long reply from Hay Sanitary Authority with regard to the request of Hereford that Hay should remove its sewage from the rivers Wye and Dulas, but that the pollution was not denied, and there was no promise to remedy the evil. The Council instructed the Town Clerk to take legal proceedings.

A REPORT made by the County Medical Officer to the Sanitary Committee of the Worcestershire County Council, having reference to the pollution of the river Cole, has been referred to as extremely satisfactory from the point of view of the Yardley District Council. It stated that the pollution was entirely due to the overflow of the Birmingham sewer at Yardley Bridge, and that the allegation that nine-tenths of the offensive matter came from Yardley could not be substantiated.

A BILL to make more effectual provision for the prevention of the pollution of rivers and streams, which has been introduced into the House of Commons by Sir F. Powell, is supported by Sir H. Howorth, Sir J. Brunner, and Mr. Brigg. The principal object of the Bill is to improve the law for preventing the pollution of streams by extending to County Councils, Joint Committees, and River Boards in England the main provisions of the Mersey and Irwell Act of 1892, and the West Riding of Yorkshire Rivers Act of 1894.

THE Rivers Committee of the Manchester Corporation have had under consideration various suggestions for disposing of the sewage of the city. The rejection of the culvert proposal has, of course, placed them under the necessity of formulating another scheme. It has been decided to make a trial of new filter beds at a cost of £28,000, and if the experiment is regarded as satisfactory, a general scheme of filtration will be forthcoming. It is stated that the ultimate cost may be as much as £500,000.

A LOCAL Government Board inquiry has been held in respect of an application made by the Windsor Rural District Council for a Provisonal Order to empower that Authority to purchase land near St. Stephen's School from the Clewer estate, for the purpose of erecting thereon an engine-house and pumping-station, in connection with Mr. Fowler's scheme of drainage for the parish, adopted by the District Council. The proposed ejection station will be in the ground at the junction of Oxford-road and Vansittart-road, and will be worked by an engine erected in a proper house on the field behind Gerald-villas (a part of Vansittart-road) a little beyond what is called Clewer Ditch.

THE new sewage works of the Sutton-in-Ashfield Council have now been formally opened. Mr. McWilliam Bishop, the Town Engineer and Surveyor, who designed the scheme, described the process adopted, which is known as the "International," combing precipitation followed by filtration, the sewage being first treated with ferozone, and then passed through Candy circular tanks with automatic sludge-removal apparatus, clarifiers, and finally purified by polarite filters, whereby rapid oxidation is effected. The effluent is remarkably clear, and the chemical analysis indicates a high degree of purity. The dry weather flow is about 260,000 gallons per day, and of a highly concentrated character, being at the rate of twenty gallons per head for a population of 13,000. Much satisfaction is expressed by the Council with the work, which has been carried out with such marked success by their own Town Engineer, Mr. McWm. Bishop.

A COMMITTEE has been appointed by the Meriden Rural District Council to consider the question of Fillongley drainage.

THE Local Government Board has sanctioned the loan for the sewerage scheme for Stapleford and Sandiacre. The cost is about £11,000.

THE engineers to the Taff Vale Windsor Dock scheme of the present session have prepared for the information of Parliament detailed estimates of the cost of the whole of the works comprised within the scheme. The aggregate estimated cost of these works is set down at £1,232,399, as compared with £854,000, which is the estimated cost of the scheme of last session. The actual cost of the proposed dock, together with the lock entrance and the diversion of the river Ely, the latter of which formed no part of the scheme of last year, will, it is estimated, require £1,081,455, as compared with £708,800.

THE Shipley District Council has decided upon a comprehensive scheme for the destruction of town's refuse, the purification of sewage, and the generation of electricity. For several years the work of ashpit cleansing has been carried out by the Local Authority at Shipley, but hitherto nothing has been done in the way of burning the refuse. It is proposed to deal with the solid refuse and the sewage on the same site, some thirty acres of land having been acquired for the purpose at Dock Field, which is between the river and the Leeds and Liverpool Canal, and adjoining the Midland branch line to Ilkley. It is intended to construct here sewage works, and in connection therewith to provide for the generation of electricity. In deciding upon a scheme the Council was met at the outset with the difficulty that all the sewage must be pumped before treatment, but an arrangement has been suggested by a member of the Council which will effect a very material economy in the working out of the scheme. Hitherto it has been the custom in electricity works to construct wells for the water which is used for condensing purposes, the water having to be drawn from the wells for this purpose. At Shipley it is intended, however, to adopt the novel and practical idea of causing the sewage to serve instead of water for condensing, and thus to avoid the expense of constructing wells. The sewage will be raised from the tank at the end of the sewers to a height of some 40ft., and will flow into a series of tanks, through which it will fall by gravitation, and will then be discharged into the river purified. The power required to work the necessary pumps it is proposed to obtain from the burning of the refuse. The steam thus raised will not only be sufficient, it is computed, to lift the sewage, but is expected also to leave a margin of upwards of 150-horse power, and this it is intended to use for the generation of electricity. The steam will be utilised in a compound condensing engine of 200-horse power, a surface condenser being used for condensing the steam. The sewage will pass through the condenser on its way from the receiving tank to the higher level, the condenser being exhausted by an independent electrically-driven air pump. It is also proposed to drive the centrifugal sewage pumps electrically.

ORIGINALLY it was intended to incorporate the sewerage of Cossall with that of Ilkeston, but this was found impracticable, and separate plans have been prepared by Mr. Walker, of Nottingham, approved by the District Council, and sent to the Local Government Board together with an application for a loan of £2300 for carrying out the work.

THE Local Government Board having been petitioned by the Midhurst Rural District Council to issue a Provisional Order to empower it to put in force with reference to certain lands required by it for the disposal of the sewage of Midhurst and parts of Easebourne and West Lavington, the powers of the Land Clauses Act with respect to the purchase and taking of lands other than by agreement, an inquiry has been held into the matter.

Lighting.

THE Clonmel Corporation has decided to expend £500 on improving the gas works, which it has lately purchased.

A LOCAL Government Board inquiry has been held at Much Wenlock into an application by the Town Council for a Provisional Order to purchase the gas works.

THE Derby School Board has instructed the Electric Lighting Committee of the Corporation to prepare a specification for lighting the Board Schools.

THE Eccleshill Gas Company, having refused to grant a reduction in the price of gas, the District Council has approached the Bradford City Council with a view to arranging terms for the Corporation to supply the public lighting of Eccleshill.

THE Darlington Town Council has confirmed the agreement made by the Gasworks Committee to engage the services of Professor Kennedy to inquire into and advise as to the best system of electric supply for the lighting of the borough.

THE electric lighting question was considered at a special meeting of the Greenock Police Board held recently, and it was resolved to make application to the Board of Trade for an extension of time in order to permit of the matter being more fully considered.

AT a recent meeting of the Cleaning and Lighting Committee of Edinburgh Town Council, it was agreed to remit the request of the Gas Commissioners to be allowed to experiment in lighting the streets of the city with the incandescent light to the Lighting Sub-Committee. There were remitted to the same Committee the various motions made by members of Council at the previous meeting on the subject of the extension of the electric light for public purposes in various parts of the city.

A LOCAL Government Board inquiry has been held at Selby into an application of the Urban District Council for a Provisional Order, under the Gas and Waterworks Facilities Acts, to undertake certain extensions and improvements to the gas-works plant.

AT a recent meeting of the Gas Committee of the Dundee County Council, the question of reconstructing the gas works, and of introducing the carburetted water gas, was discussed. A motion was carried which stated that, having regard to the additional ground now acquired, a recommendation be made to the Council to set aside any proposal for carburetted water gas in the meantime, and to instruct the manager, after consultation with Mr. Fowlis, Glasgow, to bring up plans and estimates for extensions and improvements on the works in order that an additional supply of coal gas might be produced.

THE question of electric lighting and a dust destructor for Hackney, involving an initial expenditure of at least £250,000, after having been under consideration for six years, has at last been settled. The Vestry has rescinded all the resolutions which prevented its parting with the Electric Light Order, and has decided to transfer it to a private company, and have inserted the following clause in the agreement:—"The Vestry to transfer the whole of its powers under the Provisional Order, as far as they relate to the area of the Vestry of Hackney; the Vestry to undertake not to apply for nor consent to any other application for an order for the parish of Hackney."

THE Perth Police Commissioners have adopted the following minute of the Sub-Committee:—"That after consideration of the amended plans, the Sub-Committee are not satisfied that the gas works can be carried out to the satisfaction of the Commissioners at a reasonable figure, and they recommend that an approved gas engineer be invited to visit Perth and report as to plans for the erection of gas works suitable for Perth at a cost not exceeding the sum available according to the borrowing powers under the Act; further, instruct the clerk to write to West's Gas Improvement Company, Limited, explaining the difficulties that had arisen through the manager having greatly exceeded the estimated probable cost of the new gas works, and ask them to state how far they were prepared to meet the Commissioners in tiding over their difficulties."

Obituary.

DR. MALCOMSON, M.O.H., MIDDLESBROUGH.

WE regret to announce the demise of Dr. John Andrew Malcomson, M.A., M.O.H. for the borough of Middlesbrough, which took place suddenly on the morning of the 1st inst. The deceased gentleman, who was greatly esteemed in the town and district, had been Medical Officer of Health for the borough since 1873. He was to all appearance a man of strong constitution, but it was noticed last week,

that the strain in regard to his duties connected with the present epidemic of small-pox in Middlesbrough was telling upon him. On the previous night he appeared more cheerful and in better spirits, and between 11 and 12 o'clock he lay down on the sofa, and had some conversation with Dr. Bateman and one or two other friends who were in the house. He afterwards went to bed but rose again, and at eight o'clock the following morning a maid in opening the drawing-room door found him lying on the sofa breathing heavily, and evidently very ill. A doctor was sent for, but before his arrival Dr. Malcomson expired. Death was afterwards certified to be due to cerebral apoplexy, and an inquest will not therefore be held. The deceased gentlemen was forty-six years of age. He was married ten years ago to Miss May Smith, daughter of Dr. Smith, of Derry, and leaves a widow and three children—a son and two daughters—the eldest being about eight years of age.

Correspondence.

We do not in any way hold ourselves responsible for opinions expressed by our correspondents

RELATIVE COST OF WORKS OF SEWAGE DISPOSAL.

(*To the Editor of* THE SANITARY RECORD.)

SIR,—It is generally accepted that considerable latitude must be allowed to patentees when advocating their specialities, and that many of their claims must be taken *cum grano salis*. That Messrs. Cameron, Commin, and Martin, the patentees of the Septic tank, do not intend to assume exemption in this respect, is, I think, evident from their letter in THE SANITARY RECORD of February 18th.

Had these gentlemen confined themselves to a laudation of the Septic tank and its superiority (in their estimation) to that of other systems, no exception would have been taken thereto, which would doubtless have been accurately judged for what it was worth by your readers.

When, however, the patentees indulge in framing for themselves an estimate of the cost of the bacterial system of sewage treatment as adopted at Sutton, of which they are evidently not *au fait*, in order to effect a comparison to their commercial advantage, that licence which is allowable under certain circumstances becomes somewhat, it will be admitted, overstrained.

Inasmuch as I have been responsible for the construction of the bacteria filters at Sutton for the Council—who are indebted to Mr. Dibdin for the generous manner in which he has placed his advice and the results of his wide experience in the treatment of sewage at their disposal—I am advised by others who are well acquainted with both the Sutton and the Exeter processes that it is my plain duty to your readers and to Local Authorities generally not to allow the statements of the Septic tank patentees to pass without correction.

In doing so, however, it is necessary to observe that there is no intention of depraising any particular system. The Sutton process is not a proprietary one. With the results obtained by it the Sutton Council are eminently satisfied. Whether it is adopted by other Local Authorities or not is a matter of indifference pecuniarily to anyone connected with it, and the process may be copied by any other Council without payment of royalties to any patentees. Replying to the several matters raised, I have, to facilitate ease of reference, reproduced in Column A, the points raised by Messrs. Cameron, Commin, and Martin, while in the parallel column B are my observations thereon :—

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(1) "We need hardly point out that it is impossible to lay down any scale of cost which will be generally applicable under the widely different circumstances which are met with in different places."	(1) The patentees of the Septic tank issued a pamphlet in which they say "the cost of new tanks may be estimated at £70 to £80 per 1000 for populations between 5000 and 10,000, and proportionately for larger or lesser numbers. When filtration of the effluent is necessary, the cost of suitable filter beds varies from £150 to £250 per 1000 of the population."
(2) "The works at Exeter have been designed to deal with the sewage of 47,000 people, the maximum flow provided for being 2,500,000 gallons per day. They are estimated to cost £13,940, including grit chambers, conduits to tanks and from tanks to filters, penstocks, &c., but exclusive of engineering charges. The cost is, of course, greater than for a place of the same size sewered on the separate system, in which not only would the works be smaller, but no provision for removing road grit would be necessary."	(2) Whether a place is sewered on the separate system or not does not affect the cost of works when the quantity of sewage capable of being treated is taken as the basis for comparison. As the Exeter works are designed to treat 2½ million gallons of sewage daily, and their estimated cost is £13,940, this is equivalent to £557 12s. per 100,000 gallons (exclusive of engineering charges and royalties). In Sutton works coarse-grain and fine-grain filters capable of efficiently purifying 100,000 gallons per day cost £390 (this includes all charges), or £167 12s. per 100,000 gallons less than in the Exeter process.
(3) "It is assumed, under the Exeter system, that royalties will be payable to the patentees. No royalty is included in the sum quoted above, but we may state that the royalty that we should charge in such a case would not bring the cost of our works up to that of works under the Sutton system."	(3) In any instance where the Sutton system is adopted, no royalty charges are incurred, as is the case where the Exeter system is adopted. Even without royalties the latter system costs more than the former, as shown above. In September, 1896, the patentees were prepared to accept from the Sutton Council a royalty of 3d. per annum per unit of population, which worked out to £150 per annum for royalties alone. The royalty charges of the Septic Tank Company are now, I understand, fixed at £30 per cent. on the cost of the works. Therefore to the cost of £557 12s. per 100,000 gallons, as given by the

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	patentees, must be added £167 5s. 6d. for royalties, making the cost per 100,000 gallons £724 17s. 6d., as against £390 on the Sutton process, or a difference of £334 17s. 6d. per 100,000 gallons of sewage.
(4) "In the Exeter works artificial walls are provided between the filters, but in any case where the site admits of these being dispensed with under the Sutton system, they could equally well be done without under ours."	(4) In the cost given above for filters at Sutton, artificial walls are included. The fine-grain or coke-breeze filters are essentially the same in both systems (Mr. Cameron having copied his from those at present in use at Sutton and Barking, as admitted by him in the printed copy of his evidence at the Exeter inquiry), so that the cost should be the same under similar circumstances, with this exception, that the cost of patent alternating gear will be an extra to add to the cost under the Exeter system.
(5) "Although the walls and floors do not represent by any means the heaviest part of the cost of the filters, their omission would reduce to some extent the excess of this item over the cost of the tanks. Against this must be set the possibility of reducing the cost of the tanks under other circumstances—for instance, those under consideration are larger than they would be in some cases for the same population."	(5) In no case under the Exeter system could artificial tank walls, floor, or roof be omitted, as is possible with the Sutton system. The cost of these under any circumstances must always be heavy. The suggestion as to the possibility of reducing the cost of tanks where no provision is made for storm-water is valueless when the relative costs are based on the cost of works for treating 100,000 gallons per day in each case.
(6) "The fall required is often an important factor in the cost of works. The Exeter system requires only one-half the fall necessary for the Sutton system."	(6) The Sutton system may be adopted where there is only 2ft. of available fall, so that such an objection as that raised is of no practical utility.
(7) "The '(Septic)' tank deals with the sewage without preliminary screening, thus saving the cost of clearing the screens and disposing of the intercepted matters."	(7) Any item of cost of labour in attending to filters, either in large works laid out on the Sutton system or small works, must be of necessity small, as in the former automatic screens, and in the latter duplicate screens would be provided, requiring attention once or twice per day for a few minutes. Under the Exeter system grit chambers are necessary, which, as has been shown by the evidence at the Local Government Board inquiry and in the correspondence between Mr. A. J. Martin and Mr. Somerville, will require emptying probably two or three times a year, and also that the tanks themselves will require emptying. The cost of removal and disposal of the insoluble deposit in the grit chamber and the tank will be a serious one, and counterbalance the cost of screening, &c., in the Sutton process, which is extremely small. Moreover, it appears that in very small works the tanks must be in duplicate to provide for the flow of one while another is being freed from insoluble deposit.
(8) "Secondly, they do not require the periodical trenching which is necessary for the coarse bacteria bed."	(8) The small amount of labour (only required once per week at the outside), which consists in raking or forking over the surface of the filter, entails practically no extra cost, as it is performed by the man attending to the valves. The same attention is required to the fine-grain filters in the Exeter process, which your correspondents appear to have omitted to state.
(9) Thirdly, the automatic alternating gear saves the labour which would otherwise be required to work the filters, and what is of greater importance prevents the temporary losses of their purifying power, which negligence on the part of the attendants is liable to bring about.	(9) The alternating gear, which probably is the main validity of the company's patent, is ingenious and noteworthy. Whether the cost of this will be compensated by the assumed saving in labour and regularity of working, time alone will prove. It has yet to be discovered, however, that artificial filters can be treated as automatic machines. Experience has shown, on the other hand, the opposite. Sewage varies in character from hour to hour during the day, when it is generally strong, while during the night it is of a weak character. If it be intended to give a strong sewage or effluent, the same period of contact with the filters as a weak sewage, failure will result. Moreover, during the period of maximum flow of the day sewage, when generally it is the strongest, the discharge from the septic tank will increase, and the filters will have to work faster, as the cycle of time will be shortened owing to the increased flow; hence the action of the alternating gear on the filters may be detrimental. That constancy in working of the filter which is claimed to be gained by the use of the automatic gear, may be productive of very variable effluents, and result in condemnation of the system of biological purification.
	One other objection to the alternating gear, which it is desirable should not be

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	overlooked, is that the discharge valve is opened its full diameter at the commencement, when the filtrate is liberated with a rush, carrying with it the fine material and fouling the filtrate.
(10) "If the annual saving which our system effects, even as compared with that of Sutton's, is capitalised, we venture to think it will dispel any doubt which might otherwise exist as to the relative cost of the two systems."	(10) The Exeter system cannot be adopted under the existing rules of the Local Government Board unless land is also provided. This will require that a man be in attendance to cultivate it, even in small works, and it is therefore doubtful whether under such circumstances any saving is to be effected in labour by the alternating gear over that of ordinary valves as in the Sutton system. The latter process may, however, and is already, I believe, adopted in some districts of small population, where attendance to the filters can be reduced to the brief time of half an hour or so per day.
	It has been shown that the capital cost of works under the Exeter system is very considerably above the Sutton system, and that the statement of the patentees in paragraph 3 is incorrect. Similarly the cost of working will, in any event, equal that of Sutton, although each is comparatively small.

There are many other points which may be urged in friendly criticism of the Exeter process, and the same may equally well be said of the Sutton process, but, after all, they are small as compared with the glaring defects in the old and costly precipitation processes hitherto chiefly in vogue. Whether the Exeter or the Sutton process appeals to engineers and Local Authorities as the more satisfactory is unimportant to the adherents of the latter system. Each, however, will be found to be a long way ahead, it may be confidently stated, of any hitherto known process of sewage treatment.

In conclusion, I must apologise for the undue length of this letter, and also express my personal regret that Messrs. Cameron, Commin, and Martin's letter should have necessitated a reply from me, and cause me to assume an apparently antagonistic position which is not intended.—Yours truly,

C. CHAMBERS SMITH,
Engineer and Surveyor to the Urban District Council.

Sutton, Surrey, February 23rd, 1898.

AT a meeting of the Matlock Town Council on Monday Sir George Newnes, Bart., presented the undertaking known as the Matlock Cable Tramway Company to the town, which is situated in his native district. The gift was unanimously accepted, and is worth £20,000. There will be a public recognition of Sir George's generosity.

Notes and Queries.

987.—CUBICAL CAPACITY OF TANKS &c.: BOOK ON.—"E D. G." writes:—"Could you recommend me a reliable book from which I could learn how to calculate the capacity of pipes, tanks, rooms, &c., as I know very little of arithmetic? I want one that will thoroughly explain the working out of such problems."

Answer.—The following books are recommended for the purpose required:—(1) Clarke's "Calculations of Cubic Space," post free, 1s. 0½d. (2) Maxwell's "Calculation of Areas, Cubic Space, &c.," price 2s. Either of the books may be obtained from The Sanitary Publishing Company.

988.—MICA-FLAP VALVES: HOW OBTAINABLE.—"Subscriber" writes:—Will you please inform me of the names of makers of the Mica-flap valves, also say whether the mica can be purchased separately?"

Answer.—Mica-flap valves are manufactured by Messrs. Young and Marten, Caledonian Works, Stratford, London, E.; Messrs. J. Mitchell and Co., Drury-lane, London; and Messrs. Sankey and Son, Canning Town, London, E., from whom, no doubt, mica can also be purchased separately if required.

989.—TOWN: WHAT CONSTITUTES A.—"Surveyor" writes:—"A place with 5000 inhabitants has just been given urban powers which come into force on March 25th, when it will become an urban district. Can the Surveyor be described as Town Surveyor, and what constitutes a town?"

Answer.—The term "town" is one which is used in a general sense, and cannot absolutely be defined. Usage has associated it with any collection of houses larger than a village, and when the place has a population of several thousands. Urban districts are generally described as towns. There is nothing to prevent the Surveyor of an Urban Authority describing himself as "Town Surveyor" if he desires to do so.

990.—PUMPS: FILTRATION OF WATER: BOOKS ON.—"G. G. B." writes:—"I am in want of a cheap and practical work on (1) pumps, also (2) one treating on the collection and filtration of water on a small scale. Will you kindly recommend suitable books?"

Answer.—The following books will be found to meet the requirements of our correspondent, viz.:—(1) Pumps: "A Practical Handbook on Pump Construction," by P. R. Björling, price 5s. (2) Water supply: "Rural Water Supply," by Greenwell and Curry, price 5s. The latter book contains a chapter on the filtration of water and the construction of filter-beds. Either of the books may be obtained from the Sanitary Publishing Company.

991.—DWELLING-HOUSES REQUIRING LIME-WASHING: PROCEDURE.—"A. B." writes.—"In going my rounds I have noticed several houses in various parts of the district which require lime-washing. I should be glad if you would kindly advise me what steps I ought to take as a Sanitary Inspector with a view to getting the work done as regards cleansing the houses in question. In the event of your deciding that I ought to deal with them under the head of a nuisance, ought I to serve the notice on the owner or occupier, and further, whether the owner or occupier is responsible?"

Answer.—If the dwelling-house be in such a state as to be a nuisance or injurious to health, within the definition in Sec. 91 of the Public Health Act, 1875, the Local Authority, if satisfied of the existence of a nuisance, may serve a notice on the person by whose act, default, or sufferance the nuisance arises, and in this case the notice should be served on the occupier. Proceedings in the alternative may be taken under the provisions of Sec. 120 of the Act of 1875, if the Medical Officer of

Health or any other legally qualified medical practitioner furnishes the Local Authority with a certificate that the cleansing and disinfecting of any house or part thereof, &c., would tend to prevent or check infectious disease. Where, however, the Infectious Disease (Prevention) Act, 1890, has been adopted, proceedings would have to be taken under Sec. 5 of this Act, as it repeals Sec. 120 of the Act of 1875.

992. — MEMBER OF DISTRICT COUNCIL INTERESTED IN CONTRACT: DISQUALIFICATION.—"H. T." writes:—"If a member of an Urban or a Rural District Council supplies or conveys goods to a contractor who is doing work or conveying goods for such contractor on behalf of either of these Councils, is such illegal, and what is the forfeit, if any?"

Answer.—By Sec. 46 of the Local Government Act, 1894, a person shall be disqualified for being elected or being a member or chairman of a Council of a parish or of a district other than a borough or Board of Guardians, if he is concerned in any bargain or contract entered into with the Council or Board, or participates in the profit of any such bargain or contract or of any work done under the authority of the Council or Board. It is also provided by the same section that if a member becomes disqualified for holding office, &c., the Council shall forthwith declare the office to be vacant, and that if any person acts when disqualified or votes when prohibited, under this section he shall for each offence be liable on summary conviction to a fine not exceeding twenty pounds. The provisions, as aforesaid, apply to members of Urban or Rural District Councils, and in the case named by our correspondent the member will be disqualified, and the Council are required to declare the seat vacant. He will also be liable to the penalty if he acts as a member while interested in the contract.

993.—DEFECTIVE DRAINAGE: PROCEDURE TO ENFORCE REMEDY.—"J. W." writes.—"An untrapped, unventilated, and defective drain is reported to an Urban Authority by their Inspector of Nuisances, who is thereupon ordered to serve the necessary notices. Should notice be served under Sec. 94 or Sec. 23? If served under Sec. 23 and not complied with, can the Urban Authority carry out the work and recover the cost?"

Answer.—The Local Authority have the option as to whether they will proceed under Sec. 23 or under Secs. 91-96, but there is this difference in the cases, that the course prescribed by Sec. 23 is remedial, while that under Secs. 91-6 is punitive. In the former case the object is to remedy the defective accommodation as soon as possible, and it is, as a rule, the most satisfactory course to take, while the object of Secs. 91-96 is to punish the owner for suffering defective drainage, amounting to a nuisance, to be in existence, and to seek its abatement. In the event of the owner not complying with the notice under Sec. 23 within the specified time, the Authority may do the work required, and may recover in a summary manner the expenses incurred by them in so doing from the owner, or may, by order, declare the same to be private improvement expenses.

Vacancies.

ASSISTANT ENGINEER (LONDON, E.C., March 21st).—For the Bengal-Nagpur Railway Company, Ltd. Salary, first year, Rs.450 per mensem; second year, Rs.500 per mensem; third year, Rs.550 per mensem. Mr. Robert Miller, managing director, 132, Gresham House, Old Broad-street, London, E.C.

ASSISTANT MANAGER (March 14th).—For gas works near London. Gas Company, 1, Cullum-street, London, E.C.

ELECTRICAL ENGINEER, &C. (MANCHESTER, March 14th).—Committee, Co-operative Wholesale Society, Ltd., 1, Balloon-street, Manchester.

ENGINEER (RUSKINGTON, March 12th).—For the Urban District Council. Mr. James Adlard, clerk, Ruskington, Sleaford.

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NOTICE.—On and after 31st March next the Annual Subscription to this Journal will be raised to 12s. 6d. to all NEW Subscribers. NO ADVANCE will be made to our friends whose names are entered on our Subscription list prior to that date, so long as they continue to subscribe.

THE

Sanitary Record,

MARCH 18, 1898.

Notes.

The Plague in India.

THE latest news regarding the plague in India is of the very gravest character. In the first place, as regards the ravages of the epidemic, it is exceedingly distressing to learn that so far from there being any diminution in the

number of deaths, the mortality is alarmingly on the increase. The deaths from plague during the week ending 10th March amounted to 1283, being an increase of 16·95 per cent. on the figures for the preceding week, which were 1097. The number of deaths from all causes was 2184 during the week, representing a death-rate of 136·36 per 1000, as compared with a mortality of 2080, representing a death-rate of 129·98 per 1000 during the previous week. These figures alone are sufficient to cause the gravest anxiety, but an additional ground for anxiety is provided by a telegram which announces that a new outbreak, apparently of a different description, and called the "black blister," has broken out in the Nizam's dominions, and is causing fifty deaths a day.

The Friction with the Corporation.

As if the already over-burdened Government were not sufficiently harassed by this new and alarming spread of the disease, their efforts have been further hampered, first by a most unfortunate friction with the Corporation of Bombay, and second by a very serious renewal of rioting, arising out of the native discontent with the preventive measures enforced by the Plague Committee. The Plague Committee has been spending two and a-half lakhs of rupees monthly. A steady supply of money is absolutely necessary to carry on the work, but the Corporation, in pursuance of some fatuous policy of opposition, suddenly stopped the supplies. Cheques for 38,000 rupees had been issued, to meet which there were only 4800 rupees in the bank. In this emergency Sir James Campbell, with praiseworthy promptitude, arranged with the bank for an overdraft of half a lakh of rupees on his own personal security to meet the contingencies, and thus the crisis was temporarily tided over.

The Riots.

The troubles of the Government culminated, as we have said, in a serious native riot on the 9th inst. The disturbances originated in connection with the attempted removal of a Mohammedan female plague patient to hospital. A mob collected and assumed so menacing an attitude that the police were compelled to fire, a step which had the effect of dispersing the mob for the time. They subsequently, however, reassembled and attacked one of the hospitals, and indulged also in promiscuous rioting in various quarters of the town, attacking and ill-treating isolated Europeans wherever possible. The military was promptly called out, and suppressed the disturbance, but not before a number of lamentable casualities had taken place, including two British soldiers, who were killed, though they had not been engaged in plague inspection, and several police officers, a Parsee magistrate, and a nurse, who sustained injuries more or less severe. A few of the rioters were killed, a number were injured, and a large number of arrests were made. By means of vigorous patrolling of the streets, quiet was eventually restored—at least for the time.

The Causes of the Disturbances.

Lord George Hamilton stated in the House of Commons, on receipt of this disquieting news, that he was confident that the disturbances were not due to any excessive or unnecessary severity in the enforcement of the sanitary regulations. Every effort is being made by the Government to avoid irritating the religious susceptibilities of the natives, and with this object they are endeavouring to secure the co-operation of native gentlemen of position and influence in their humanitarian work. But notwithstanding this, there is no blinking the fact that the operations of the search parties, however decorously conducted, the quarantine rules, and especially the regulations for death registration, wound the religious feelings not only of the Hindoos, but also of the Mohammedans. So deep is the feeling of irritation that the shopkeepers of both sections of the people have closed their premises, by way of protest against the plague measures, and about 15,000 dock labourers and carters have gone out on strike. The result threatens to be commercial panic, and may have serious consequences. In view of the bitter feeling throughout the city, the Plague Committee can hardly prosecute their labours without providing adequate protection for the search parties in the work of visitation. It is, in truth, a hard and a thankless task which the Government of Bombay have before them, when their efforts to save the devoted city from ruin meet with nothing but blind prejudice and bitter hostility.

The Small-pox at Middlesbrough.

It is a relief to turn from this black picture of sanitary administration abroad to a brighter state of affairs at home. We are thankful to hear that the epidemic of small-pox at Middlesbrough is abating, though the Sanitary Authorities are hardly yet in a position to relax their efforts. The number of cases notified last week showed a steady and most gratifying decline from day to day. From nineteen in one day in the beginning of the week, the number of fresh cases fell on Thursday to eleven, and on Friday to only eight, five, however, being from houses previously free from infection. All the cases were promptly removed to hospital. Two of the latest sufferers were workmen from London, who were engaged in constructing the temporary corrugated iron hospitals, and one of them succumbed. The outlook is, however, now much brighter. The epidemic is evidently dying down, and the Authorities, whose energy in coping with the malady has been most praiseworthy, are to be congratulated on the prospect of soon being able to see the town completely freed from the disease.

Food and Drugs Adulteration.

On Friday last a deputation from the Federation of the Grocers' Associations of the United Kingdom, claiming to represent 150,000 shopkeepers in the provision trade, waited on Mr. Chaplin, President of the Local Government Board, to urge upon the Government the desirability of bringing in at the earliest possible opportunity a Bill to amend and consolidate the Sale of Foods and Drugs Acts, 1875 and 1879, and the Margarine Act 1887, on the lines of the recommendations contained in the report of the Select Committee on Food Adulteration published in 1896. In urging their point, the deputation made it clear that, so far from having any objection to the principle of the laws in pre-

vention of adulteration, they wished to see them strengthened and enlarged.

Lack of Unanimity in the Trade.

Mr. Chaplin, in his reply, promised to give his closest attention to the various questions pressed upon his notice, but at the same time pointed out that one of his greatest difficulties in formulating legislation lay in the fact that not only had there been considerable difference of opinion in the Parliamentary Committee, but in the trade itself unanimity was still far from being attained. One of the points to which the Committee attached almost more importance than to anything else was the provision whereby they recommended that the colouring of margarine and the mixing of margarine and butter should be altogether prohibited, and to this provision many of the members of the Federation offered strong objections. Another question discussed in the memorial of the Federation was the constitution of the Court of Reference, and in dealing with this Mr. Chaplin dwelt upon the difficulties in determining the scope and character of the proposed Court. All these matters, as well as the questions of invoice warranty, more efficient inspection, and greater uniformity in prosecutions, would, he said, require anxious consideration.

Public Health in Glasgow University.

The advocates of the institution of a separate Chair of Public Health in the University of Glasgow have not so far succeeded in attaining their object. The subjects of forensic medicine and public health, which have hitherto been taught by one professor, are to continue to be so associated, and the chair rendered vacant by the retiral of Professor Simpson has been filled by the appointment of Dr. John Glaister. Though it is a matter for regret that the opportunity to separate the two subjects has not been utilised, and the establishment of a chair for the exclusive treatment of public health, which must come some day, has in the meantime been deferred, we are glad to see that the present appointment has been conferred on so able an exponent of hygiene as Professor Glaister. He is a Diplomate in Public Health of Cambridge; he has for a number of years taught hygiene as well as medical jurisprudence in St. Mungo's College, in which institution he has had a sanitary science laboratory for some time under his direction; he has for several years been examiner in public health, as a special subject for study and examination for the Royal Colleges of Physicians and Surgeons of Edinburgh, and the Faculty of Physicians and Surgeons of Glasgow; he is a Fellow and Member of Council of the Royal Institute of Public Health, and a Member of the Council of the Sanitary Association of Scotland; and he has made his mark in the literature of sanitation. With such a list of qualifications, in addition to others of a like nature to which we have not referred, sanitarians will feel well satisfied that Professor Glaister will give due prominence to the public health side of his chair. We heartily congratulate him on his appointment.

Influenza in Parliament.

The frequent mention in the columns of the daily Press of the prostration of many members of Parliament through the prevailing scourge of influenza, has given rise to an impression in the public mind that an unusual proportion of our legislators have been the victims of the fashionable malady. This impression is happily unfounded. As a matter of fact, influenza has not been more rife in Parliament than it has been elsewhere, and the number of members of the House of Commons who have been laid aside is comparatively small. Owing to the eminent position of some of the sufferers, among whom falls to be included the Prime Minister, the public have not been slow to note the existence of the epidemic in Westminster, and have formed greatly exaggerated notions as to its extent. Dr. Farquharson, who as a medical member is well qualified to speak, has stated that the House of Commons is well ventilated, and the general conditions of the House are on the whole so healthy and well arranged that members are not likely to become victims in exceptional numbers to an epidemic.

Unsound Meat Destroyed Without Justices' Order.

The case of Ormerod *v.* Mayor, Aldermen, and Burgesses of Rochdale, decided at the Manchester Assizes on February 11th, is one which should be of considerable utility to Officers of Health. The action was brought by a butcher against the Corporation named, to recover damages for the improper destruction of meat belonging to the plaintiff by the Medical Officer of Health and the Assistant-Inspector of Nuisances, the latter of whom, acting under the directions of the Medical Officer, seized a quantity of meat exposed in the plaintiff's shop, which appeared to be unfit for the food of man, and destroyed it without having first obtained an order of justices, as required by Sec. 117 of the Public Health Act, 1875. It was contended for the defendants that the meat was unfit for food, and that the plaintiff assented to its being destroyed; and further, assuming the meat was good, the Medical Officer of Health and Assistant-Inspector of Nuisances were not the servants of the defendants in seizing and destroying the meat, nor did they seize or destroy by the orders and directions of the defendants. The jury found a verdict for the plaintiff, and assessed the damage at £50. It was held by Bruce, J., that the two officers were the servants of the Corporation, that they were acting within the scope of their duties as such, and that they neglected to take the proper steps to have the meat condemned by a justice, as required by Sec. 117 of the Act of 1875, and for these reasons he gave judgment in accordance with the verdict of the jury. The case is one which shows the necessity of Officers of Health proceeding strictly within the provisions of the Act, and how an omission in procedure may involve Local Authorities in unfortunate consequences.

Wigan.—Mr. G. Heaton, surveyor, is preparing a scheme for laying water-pipes from the boundary of Upholland to Finch-lane, Wrightington, in order to proceed with the work at once.

NOTES ON PRACTICAL SANITARY SCIENCE.

By WILLIAM H. MAXWELL.

Assistant Engineer and Surveyor, Leyton Urban District Council, Author of "Drainage Work and Sanitary Fittings," "Ventilation, Heating, and Lighting," &c., Certificates of the Association of Municipal and County Engineers, and Sanitary Institute.

No. 53.—REFUSE DESTRUCTORS.

(*Continued from page* 252.)

BEAMAN AND DEAS' DESTRUCTOR.

In addition to the towns named on p. 249—March 11th—it should have been mentioned that the Corporations of Canterbury, Cardiff, and Sheffield (10 cells), and the Llandudno Urban District Council have also determined upon the erection of the Beaman and Deas' furnace.

As regards the capacity of this type of destructor it has been found capable of dealing with 24 tons of house refuse per cell per 24 hours, whilst the *average* consumption of the furnaces named in the accompanying table (compiled in 1892 by Mr. G. Watson) will be seen to be 6·3 tons per cell per 24 hours.

The table is as follows :—

Name of town.	Number of cells.	Make of cells.	Average tons burnt per day of 24 hours.	Equal to tons per cell per 24 hours.	Cost of burning per ton. Returns deducted in each case.
					s. d.
Battersea	12	Fryer's	8 1¾	6·81	2 2½
Bradford	24	Fryer's, fitted with Horsfall's steam jet	170	7·09	1 5
Ealing...	4	Fryer's	20	5·00	0 4½
Hornsey	6	Warner's	35	5·83	0 10¼
Leeds	Burmantofts, 14	Fryer's, fitted with Horsfall's steam jet	216	6·00	1 7¼
	Armley-road, 12	Do. do. do. do.		6·00	
	Kidacre-street, 10	Combination of Fryer's and Horsfall's		6·00	
Leicester	6	Fryer's, with Biddle's patent grate bars	33	5·50	1 3
Newcastle-on-Tyne	6	Warner's	48	8·00	1 0¼
Southampton	6	Fryer's	50	8·33	Profit 2¾
Bolton	8	,,	50	6·25	0 2½
Bury	4	,,	20	5·00	1 10½
Liverpool	12	,,	96	8·00	1 3
Salford	6	,,	28	4·66	1 6
Whitechapel	8	,,	60	7·50	2 3
Oldham	6	Horsfall's	37½	6·25	1 1

Assuming the consumption of a Beaman and Deas cell at the rate of 24 tons of unscreened refuse per 24 hours, and an average water evaporation of 1 lb. per pound of refuse[136], the theoretical value of a cell in indicated horse-power, supposing an engine to consume 20 lb. of steam per indicated horse-power per hour, would be :—

$$\frac{2240}{20} \text{ (pounds of water evaporated per hour)} =$$

112 indicated horse-power continuously all the time of working.

At the Leyton installation of the Beaman and Deas destructor (which has been built not only for the cremation of house refuse, but also for the disposal of pressed sewage sludge cake from the Leyton Sewage Works), many tests have been made by various public authorities in the burning of house refuse, slaughter-house offal, market vegetable refuse, &c., of which the following are some of the particulars :—

St. Pancras Vestry Test at Leyton.—On the morning of May 11th, 1897, a consignment of refuse amounting to 18 tons 13 cwt. 3 qr. was taken down to Leyton by the Vestry's contractor for the collection of house refuse. The charging of the first cell commenced at 7.30 a.m., and that cell continued at work until 7.20 p.m., having destroyed in that time eight charges. The work on the other cell was commenced at 7.55 a.m., and continued to 9.15 p.m. This cell also destroyed eight charges.

The average time the fires were at work was therefore 12 hours and 40 minutes, during which time 16 tons 13 cwt. 3 qr. were consumed, being at the rate of 15·8 tons per cell per day of 24 hours. It should, however, be stated that owing to a mistake in placing too heavy a final charge in the second cell, a considerable delay occurred, otherwise the quantity burned per cell would have been higher.

Two men only were needed for the work, and charging their rate of pay at the same as is paid by the Vestry, viz., 6½d. per hour, the cost of burning the refuse was 9¾d. per ton.

The rate of temperature throughout the test was very high indeed, beyond the range of the ordinary test, probably between 2000 and 2500 deg. Fah., and with such a temperature there was, of course, no difficulty in keeping up the steam pressure in the boiler. In fact, the hot air had to be passed through the bye-pass flue, as the boiler commenced blowing off steam one hour after the commencement of the test.

The test was carried out in the presence of the Vestry's engineer, Mr. W. Nisbet Blair, and the Superintendent of the St. Pancras Destructor Works.

Deptford Cattle Market Refuse Test.—In this test 6 cwt. 2 qr. of slaughter-house offal were

[136] *Vide* paper on "The Disposal of Town and other Refuse by Burning," by James Deas (*Journal of Sanitary Institute*, vol. xvi., page 17.)

mixed with 12 cwt. of gasworks breeze, making a total of 18 cwt. 2 qr. The whole quantity was completely consumed in fifty minutes.

The residuals amounted to 2 cwt. 3 qr., or 14·86 per cent. The temperature in the combustion chamber is stated as having been over 2000 deg. Fah. This test tends to prove that this class of refuse can be successfully dealt with in a Beaman and Deas furnace in a proportion of 1 of refuse to about 1¼ of coke breeze.

Whitechapel District Board of Works Test.—This test was made by the Whitechapel Authorities in March, 1897, as some difficulty is experienced in the cremation of vegetable garbage by the destructors (Fryer's) at present in use in that district.

As a result of the test, Mr. J. Paget Waddington, the engineer and surveyor to the Whitechapel Board of Works, reported to the effect that the refuse, which consisted of about equal proportions of green vegetables and wet straw collected from the Spitalfields Market, together with rough house refuse from the Whitechapel district, was conveyed to Leyton and consumed in the Beaman and Deas furnaces at an average rate of 24 tons per cell per 24 hours. The quantity of clinker produced was 20 per cent. of the whole, and resulted mainly from the house refuse in the mixture. The clinker was of excellent quality, being hard and clean, and no unconsumed refuse was drawn from the furnaces while clinkering operations were performed. The temperature of the combustion chamber was maintained at a high degree during the time the refuse was being burned, and apparently at no period of the trial were unconsumed fumes given off from the furnaces.

Report and Tests by Sir Douglas Fox, M.I.C.E., on the Leyton Refuse and Sludge Destructor, erected under the Beaman and Deas patents:—As the installation at Leyton is, so far as I am aware, the first destructor which satisfactorily deals with the disposal of pressed sewage sludge, and as the works have excited considerable interest amongst public Authorities, the details of a test and examination conducted in April, 1897, by Sir Douglas Fox, cannot fail to be of interest to municipal engineers and surveyors. The particulars are as follows:—

"*Construction of Plant.*—The plant consists of eight destructor cells, built in pairs back to back. Each pair of cells has a common combustion chamber, from which the products of combustion pass into the main flues leading to two 96-horse power Babcock and Wilcox water-tube boilers, and thence by underground flues to a chimney 150ft. in height.

"The refuse to be consumed is charged through hoppers (which have no doors, but are usually covered with the refuse) on to an inclined hearth leading to a horizontal grate, the bars of which are set very close together. The ashpit is closed and a forced draught, at a pressure of about 2in., is supplied by a fan. On the side of the grate opposite that from which the refuse is fed in is a fire-brick chamber wall, and beyond this is a narrow vertical fire-brick chamber (called the combustion chamber), where the burning gases meet a secondary air supply, designed to aid the consumption of any unoxidised products which they may contain.

"The refuse about to be burned, lying on an inclined hearth, is partially dried by the radiant heat from the refuse which is already burning on the grate; and when it is drawn down on to the grate does not smother the fire, but begins to burn readily.

"*Outline of method of Trial adopted.*—A twelve hours' trial was carried out on Tuesday, March 30th (1897). Two pairs of cells were used, the remaining two pairs being left cold throughout the run. In the course of the trial the character of the refuse burned, and the quantity of refuse consumed, the amount of water evaporated in the boilers, and the weight of clinkers produced, were observed and determined. A special examination was also made of the nature of the escaping gases, and numerous samples for analysis were taken. The temperatures of the combustion chamber and of the flue gases were also ascertained, and the results in detail are set forth below.

Character of the Refuse Consumed.—The refuse consumed consisted of a mixture of ordinary *house refuse and filter press cakes of sewage sludge* from the Leyton Sewage Works. These were used as nearly as possible in the proportion of two parts of house refuse to one part of sewage sludge by weight.

"Observation of the character of the house refuse during the day showed that it was fairly dry (the weather being fine), but of rather poor quality from a heat-producing point of view; that is to say, the quantity of cinders was small, such refuse of household fuel as was present being to a great extent merely fine ash, containing but little combustible material. A considerable part of the refuse consisted of old tins and crockery, and there was also a good deal of green vegetable refuse, probably more than the usual average.

"The other material consumed—the sewage sludge—arrived from the filter presses in a wet, pasty condition. It was analysed both for moisture and the percentage of combustible material (carbonaceous matter) which it contained. The proportion of water exhibited some fluctuation, as is apparent from the following analyses:—

	Water per cent.
Sample A	61·23
Sample B	68·50
Average	64·86

"The average amount of combustible carbon was also determined. Carbon calculated on the dried sewage cake, 18·49 per cent. This quantity corresponds with 6·50 per cent. of combustible carbon on the wet sewage cake containing 64·86 per cent. water.

"It will have been seen from these figures that not only is the sewage cake very wet, but that it contains only a small percentage of combustible matter. A mixture of one part by weight of this material and two parts of house refuse of low quality is therefore a very poor fuel.

NOTICE.—On and after 31st March next the Annual Subscription to this Journal will be raised to 12s. 6d. to all NEW Subscribers. NO ADVANCE will be made to our friends whose names are entered on our Subcription list prior to that date, so long as they continue to Subscribe.

THE SANITATION OF DOMESTIC BUILDINGS.

By Frank Latham, C.E., M. San. Inst., &c., Assistant Surveyor, Borough of Margate.

CHAPTER VI.

Section 1. (*continued*).

Some of the most sanitary forms of water-closet apparatus now in use are constructed on the wash-down principle, which provides the foregoing desiderata in a very satisfactory manner. The up-to-date pedestal valve closet (Fig. 56) might

Fig. 56.

be placed one of the first on the list of sanitary closets, recent improvements having brought it to the front. This closet is made on the wash-down principle, but in order to retain a deeper seal of water in the trap, without giving rise to the soil and paper not clearing the basin, a valve is placed at the mouth of the trap, which opens upon the handle being raised for flushing, and upon so doing the water seal is at once lowered to the ordinary

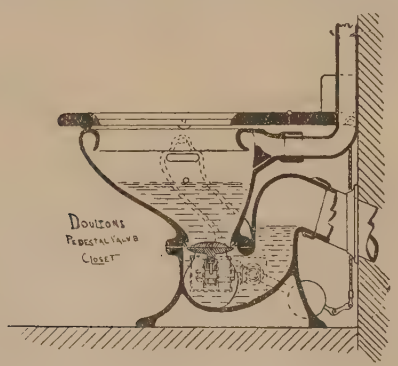

Fig. 56.

depth of the trap, and when the valve is replaced is again heightened by being held above its level. The best of these closets are simple in construction, nearly as much so as any apparatus, there being no open spaces such as existed in the old forms between the valves and water in trap, for the collection of foulness to be let loose into the house upon the valve being opened, nor is any extra ventilation required, owing to the valve being always below water level. The pedestal valve closet is especially adaptable for private houses and places where they are not subjected to rough usage, as the valve upon being damaged would not retain the extra amount of water required. There is also a likelihood, as in the plug closet, of paper getting between the valve and basin, thus letting the water escape; but even then the closet is not rendered unsanitary, provision being made, as before said, for the ordinary height of water in the trap to cover the valve, so that it is always under water.

In most valve closets an overflow pipe is fitted near the top of the basin to prevent its running over in the event of the valve in the flushing cistern getting out of order and causing flooding in the closet. This flooding is an occurrence not likely to take place often, but it requires guarding against, and in a proper manner. Many closets have been ridiculously rendered insanitary by the fixing of this pipe. It has been trapped and taken direct into the soil pipe, and, of course, there being little or no water to pass through it, it becomes unsealed, and remains so to ventilate the drains into the house until discovered and rectified. It has also frequently been connected in the valve chamber, a box between the trap and

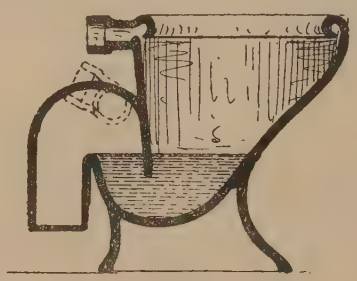

Fig. 58.

valve, existing in most valve closets, and which would convey the foulness of this chamber into the house. The pipe should be as short as possible, properly trapped, and connected with the outlet side of valve box, and the apparatus so constructed that the pipe and trap may be simultaneously flushed with the closet basin by means of the flushing rim, as is the case in Jennings' "Era" and Dent and Hellyer's "Optimus." This arrangement equally applies to the pedestal valve closet, which should always be provided with an efficient overflow.

All pedestal closets should be provided with lead safes underneath, each having an inch waste pipe taken through wall into external air, with its end covered with a brass flap valve to prevent draught. Equally efficient to the valve closet, but of different construction, is the syphon action apparatus (Fig. 57). This closet is constructed with the best form of wash-down basin, its chief features being that the trap in connection with the basin is carried up higher than usual. This affords the advantage of the water standing higher in the basin, giving a safer seal than usual, and less exposed surfaces to become soiled, the water surface being sometimes 12 by 10, and the depth of seal in trap 4in.; but with the assistance of the syphon action occasioned by a second trap on the outgo, which sets up a vacuum upon the apparatus being flushed,

the basin is enabled to properly clear itself of its contents. Several of these syphon closets (Jennings' Century) have been fitted in connection with the public lavatories at Margate, and also in the prisoners' cells in the Police Station, some having been subjected to unusually hard wear for four years, and up to the present are as good as new, and have given perfect satisfaction.

Next comes the ordinary wash-down closet (Fig. 58), which, when properly shaped, gives good

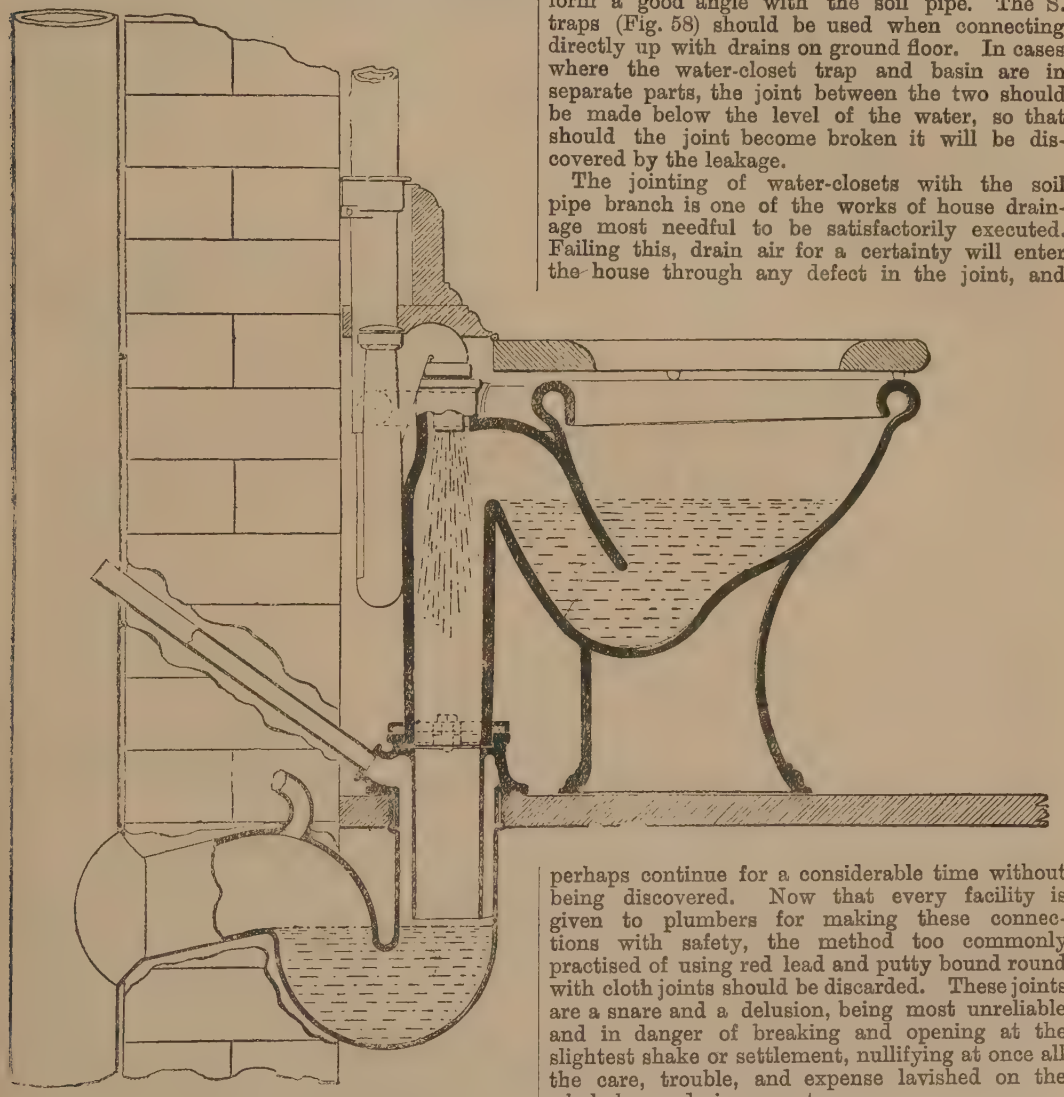

Fig. 57.

water surface, and with a sound flushing rim is an inexpensive and sanitary apparatus. This closet consists merely of a basin and trap, generally made in one piece, and so constructed that the soil is at once immersed in a good body of water, and upon being flushed is delivered directly into the soil pipe. A number of these forms of wash-down closets (Doulton's "Simplicitas") have been fixed under the author's supervision, and given great satisfaction.

All closets should be manufactured with proper flushing rims, which should cause the water to thoroughly wash clean the whole of the surface of the basin. The outlet pipes of closets should always be connected to the branch soil pipe above the floor, as in Fig. 58, so that the joint with the soil pipe branch may be properly seen and not hidden from view, as is the case in Fig. 54. It will be found best to use water-closets with half S. traps (Fig. 56), when the apparatus is to be jointed with a soil pipe branch through a wall, as by so doing the joint remains in sight, and the outgo will form a good angle with the soil pipe. The S. traps (Fig. 58) should be used when connecting directly up with drains on ground floor. In cases where the water-closet trap and basin are in separate parts, the joint between the two should be made below the level of the water, so that should the joint become broken it will be discovered by the leakage.

The jointing of water-closets with the soil pipe branch is one of the works of house drainage most needful to be satisfactorily executed. Failing this, drain air for a certainty will enter the house through any defect in the joint, and perhaps continue for a considerable time without being discovered. Now that every facility is given to plumbers for making these connections with safety, the method too commonly practised of using red lead and putty bound round with cloth joints should be discarded. These joints are a snare and a delusion, being most unreliable and in danger of breaking and opening at the slightest shake or settlement, nullifying at once all the care, trouble, and expense lavished on the whole house drainage system.

TO OUR READERS.

The Editor solicits the co-operation of readers in making THE SANITARY RECORD *more attractive by means of pen-and-ink sketches, photographs, and diagrams. There are many phases of sanitary work which lend themselves admirably to illustration. By this means not only individual articles, but the journal as a whole will be heightened.*

THE SUCCESS OF VACCINATION AND OTHER PREVENTIVE MEASURES IN SMALL-POX.

By MEREDITH YOUNG, M.D., Mast. Surg., D.P.H., Medical Officer of Health and Med. Supt. Crewe Corporation Hospitals.

(Continued from page 255.)

Nurses and Attendants.—In this special class I propose to consider briefly the cases of 20 persons, 12 of whom lived inside the small-pox hospital and 8 outside. All these persons, owing to their occupation, were exposed directly on innumerable occasions to infection from the most virulent, and, indeed, from all kinds of cases of small-pox. The nurses, for example, must have inoculated themselves time after time with variolous matter, and this surely affords a crucial test of their protection. The hospital attendants, cooks, ward-maids, laundry women, caretaker, porter, ambulance men, disinfector, &c., were in the wards many times during the day; and, of course, lived under the same roof, and in the next rooms often to the small-pox patients.

Those attendants who lived outside, such as extra ambulance men, extra laundry women, house disinfector, &c., by reason of their work, came into close and daily contact with infected clothing, infected persons, infected houses, &c. Yet of the 12 inside attendants, only 1, a nurse who had been twice vaccinated unsuccessfully, contracted small-pox, and the attack was a very mild, abortive, discrete one, so mild that she was never off duty during it. The others were all re-vaccinated, and escaped entirely.

Of the 8 outside attendants, 1 had had small-pox at the beginning of the epidemic, 6 had been re-vaccinated, and 1, who was employed only for a few hours in fixing a stove, &c., inside the hospital, had been vaccinated in infancy, and stoutly refused re-vaccination. The latter was the only person to take the disease. He was 53 years of age, had three small unfoveated scars, contracted a confluent attack, and was 50 days in hospital.

Remarks.—In connection with these statistics, I may say that the cases recorded affected, with only two exceptions of men from a common lodging-house, entirely the better class of artisans, and that the habits, work, surroundings at home and at work, were similar in both the vaccinated and unvaccinated class. No single one of the cases recorded came from an overcrowded or insanitary part of the town.

The previous health was always inquired into, but in only 2 fatal cases, 1 vaccinated and 1 unvaccinated, could any unsatisfactory history be discovered; these 2 cases were both alcoholic. I have several times been asked if in any case the copious eruption interfered with the appearance of the vaccination cicatrices, or rendered their discovery difficult; my answer has always been in the negative.

I have also been asked whether in any of the unvaccinated cases ill-health has been given as a reason for not having had the vaccination done; my answer has always been that I have been alive to the possibility of this, but have never found it to be the case.

Influence of Hospital on Surrounding Houses.—Taking the hospital as a centre, there are 17 inhabited houses with about 85 persons living in them within the quarter-mile radius. Only one case of small-pox occurred in these houses during the whole of the epidemic, and this was traceable to personal convection. This house was situated 250 yards from the hospital.

In the zone between the quarter and half-mile circles there are 1436 inhabited houses, with a population of about 7180 persons living in them. Of these 1436 houses 16 were visited by small-pox, all the 16 were outside the three-eighth-mile radius, and most of them were near to the extreme limit of the half-mile radius. In all 30 cases occurred in the zone between the quarter and half-mile radii.

I cannot think that these cases owed their origin to radiation of infection from the hospital, for the following reasons:—

(1) Three of the cases—affecting two houses—were imported from outside districts.

(2) The hospital was situated on a hillside, nearly at the top, at an elevation of 300ft. above sea level, whilst the average altitude of the affected houses was 190ft. above sea level.

(3) A fairly dense wood intervened between the hospital and the affected houses.

(4) Most of the affected houses were on the main road passing through Brighouse from the adjoining large towns of Halifax and Huddersfield, and this main road is literally infested with tramps. Others of the affected houses were on the side of the main road joining Halifax with Wakefield and Leeds, and this road is similarly favoured by vagrants.

(5) Had the hospital been the source of infection, one would have expected to find the greatest number of cases in the houses nearest to the hospital; whereas almost the exact opposite of this was the case.

(6) Had the hospital been the source of infection one would also have expected the greatest number of cases to have occurred at a time when the hospital contained the greatest number of cases, or the most severe cases.

But the greatest number of cases occurred in these houses towards the end of the epidemic, when the hospital contained only a few mild cases.

These considerations seem to me to render it highly improbable that this hospital acted as a centre of infection to the neighbourhood.

Measures adopted during the Epidemic.—Briefly, these were:—

(1) Free vaccination and re-vaccination by the hospital authorities of all persons who had been exposed to infection.

(2) Prompt isolation of all notified cases.

(3) Disinfection of houses, and whilst this was going on the inmates sent to hospital to have disinfectant bath, and have all clothing, &c., disinfected by steam.

(4) *Quarantine* of inmates of infected houses.

This calls for some special remark. It was only carried out throughout the whole epidemic by one of the districts concerned, the expenses being considered by the other districts as illegal and liable to be surcharged by the auditors of the Local Government Board. As a matter of fact, however, the

accounts for quarantine, which were heavy, met with no adverse remark from the auditors, the presumption being that in a time of epidemic, and more or less general panic, a Local Authority is justified in going a little beyond the actual limits of the law for the good of the town.

There was no difficulty experienced in getting people to remain in quarantine for fourteen days, even when shops and public-houses were concerned. The inmates were visited daily by a man who took a list of the provisions, &c., required, and obtained these at the Local Authority's expense, due regard always being paid to the reasonableness of the demands.

All quarantined houses were visited by me daily in order to detect any further case without delay.

Personally, I think that where prompt isolation of the patient, disinfection of the house, &c., and vaccination or re-vaccination of the inmates, can be carried out at an early date, quarantine is quite unnecessary; the house should simply be kept under medical supervision, and a certificate might be given in necessary cases to employers stating that all known precautions had been complied with, and that unless they heard to the contrary, no further danger need be feared from the house in question.

Where these precautions were not adopted by the inmates of infected houses, a note might be sent to the employers stating this and warning them of possible danger.

Of course the two objections to this system are, first, that to the popular mind it is "making fish of one and flesh of another," and it might not therefore meet with the approval of Local Authorities; and, secondly, that the whole matter would really be left to be decided by the employers, who might, on the one hand, refuse to continue the employment of persons who had adopted all these precautions, or, on the other hand, might continue the employment of those who had taken no precautions. But I have tried it in a fair number of cases, and met with no difficulty of this kind.

(5) As small-pox is frequently spread by mild cases, which are mistaken either for measles or chicken-pox, I advised my Board to include these diseases temporarily amongst those compulsorily notifiable, and to issue special notices that the "dual" notification by householders, as well as medical men would be insisted on. I feel confident that this would be of great benefit in checking the spread of an epidemic, and had it not been that it was towards the end of the epidemic when I suggested it, I think the Local Board would have adopted it. It appears to promise as much benefit as the temporary notification of diarrhœa in cholera times. I should state that when I made this proposal I was asked why it should not be extended to other diseases simulating small-pox, such as syphilis, acne, herpes, &c. I replied that syphilis and herpes, at least, were probably not of such common occurrence as to warrant this, and that none of them were so commonly confused with small-pox as measles and chicken-pox. These last two have, in common with small-pox, a sudden onset, and a febrile and infectious nature, which the others have not.

ERRATA.—The word "severe" in the first line of paragraph 3, page 255, should have read "mild."

INCORPORATED
Society of Medical Officers of Health.

RETURN CASES OF SCARLET FEVER.

A GENERAL meeting of the members of the Incorporated Society of Medical Officers of Health was held on Friday evening at the offices of the St. Giles' District Board of Works, High Holborn. The president, Dr. E. Seaton (Surrey), occupied the chair, and those present included Dr. J. Wright Mason, Drs. Gwynn, E. G. Yarrow, R. Dudfield, Lovett, Kempster, Woodford, E. A. Herrington, R. Shannon, E. M. Goodall, O. Field, S. Davies, E. H. Snell, W. Lake, St. Clare Shadwell, H. Kenwood, Bond, Wilson, F. H. Turner, J. H. Buchanan, E. Willoughby, E. Carnall, F. J. Allen (hon. sec.), and Mr. Wolff Defries.

Dr. J. WRIGHT MASON, M.B., C.M., D.P.H., M.R.C.S., Medical Officer of Health, Kingston-upon-Hull, and Hull and Goole Port Sanitary Authority, read an interesting paper on "Secondary Scarlatina and 'Return' Cases," which, he said, was based upon observations in hospitals of patients who had contracted a second attack whilst under treatment therein, secondary infection whilst under treatment at home, and of return cases occurring through patients discharged from hospitals disseminating the disease. Secondary scarlatina, occurring either in hospital or during home treatment, might be more severe than the primary attack, and might terminate fatally. The most susceptible period of life for secondary attacks are children between the ages of 5 and 8; they are more common among females than males, and more frequent and fatal in the autumnal quarter than in any other season of the year. From the clinical history of such cases the primary infection is usually mild and attended with little constitutional disturbance, and it would seem as if when those persons are again exposed to infection they may be susceptible to a second attack. Further observation showed that some families are more liable than others, whilst some enjoyed immunity. This natural power of resistance was found to present very remarkable degrees of variation in different persons and families. In secondary cases the whole virulence of the disease was most frequently concentrated in the throat, the joints swell, and the patient may be said to have a rheumatic attack. On the other hand, a secondary attack may be so mild that it may pass unrecognised, and may be a source of infection on the discharge of the case or the supposed convalescence of the patient at home. Secondary inspections were more common in urban than in rural populations, possibly owing to the overcrowding and congregation of the children; they most frequently occurred in small houses, the infection being accelerated by the attempted isolation of a case or cases. Secondary cases were less common in hospitals, and this was attributable to, he believed, increased air space, better ventilation, and grouping of cases according to the various stages of convalescence, which by diluting the infective material lessens the susceptibility to secondary infection. He did not agree with Gottstein's theory that certain acute specific diseases are definitely held to confer immunity, and that scarlatina, small-pox, and

measles are invariably held to do so. The history of scarlatina during the last fifteen years shows a gradual diminution in the average vitality, and the cases generally have been of a mild type, occasionally rendering it very difficult to differentiate between scarlet fever and non-specific ailments. The recurrence of each succeeding epidemic wave is influenced and characterised in its fatality by existing and varied meteorological conditions, and the tendency to spread is increased by atmospheric humidity, especially the absence of wind or rain. They must not, however, forget the important part that the introduction of hospitalism has played in minimising the vitality and reducing the infective material and its natural influences. Secondary scarlatina is more common than was generally recognised, and had, he believed, only been observed since the adoption of the notification of infectious diseases. Although he was not prepared to submit reliable statistics appertaining to secondary scarlatina, investigation in this direction was worthy of consideration. Return cases of scarlet fever, apparently resulting from the return home of the patient after isolation, were always a cause of anxiety to those responsible for the administration of infectious diseases hospitals, but he was not prepared to argue that this is an indictment against the administration of such institutions, as return cases occurred in the best administered hospitals. Return cases were altogether unavoidable, and their occurrence in a certain proportion was universal wherever hospital isolation is practised. Although a great number occurred after hospital isolation, their frequency was far greater than those treated at home. At Hull out of 2032 cases treated in hospital there were 81 return cases, or 3·9 per cent.; but out of 3487 cases treated at home there were 987 infections, or 28·3 per cent. It was generally acknowledged that the period when these return cases were most prevalent was in two seasons of the year, but more numerous in the autumnal quarter. This, he believed, was due to a very great extent to the overcrowding of the hospitals, with the consequent more or less premature discharge of patients in order to facilitate the admittance of others. But from a public health point of view, was this practice advisable? Notwithstanding the fact that there are risks of infection from the patient if he be too long delayed in an infected atmosphere, Local Authorities should make every provision for patients, and provide each hospital with convalescent sections. The probability of patients propagating the disease on their discharge would then be greatly reduced. Dr. May, after mature experience, states that he knows of no positive proof or indication as to when infection no longer exists in a scarlatina patient. The varied causes accountable for return cases Dr. Mason summarises as follows:—(1) Imperfect disinfection of clothing; (2) infected material being stored in the cavities of the mouth, nose, and lungs; (3) discharges from the ear and nose; (4) unrecognised secondary scarlatina patients whilst in hospital; (5) the specific poison which is stored up in the body for a considerable period, not being eliminated, disseminating the disease to healthy persons. Then they must not forget the liability of persons becoming infected in the ordinary manner. The average period of infection in the statistics he had given was about fourteen days, but he had frequently observed that when direct infection was conveyed by a patient, it occurred two or three days after their return home, and the remark equally applied to cases isolated at home. The more severe the attack the longer was the case likely to be infective. He agreed with Dr. Boobbyer that return cases occurring in a household are of greater severity than primary cases, and attended with higher mortality rate. In reference to the length of time isolation should be practised, Dr. Neech, after observing some fifteen thousand cases, stated a minimum period of fifty-six and a maximum period of ninety-one days' retention in hospital may be considered safe until the contrary was proved. It was generally accepted that scarlatina in its causation and dissemination was little influenced by sanitation, but there were some facts which pointed to a close relationship between the fatality and unhealthy dwellings of our crowded cities and towns. The conditions which tended to promote general unhealthfulness had a controlling influence over a general mortality, and in scarlatina sanitation would not only improve the general healthfulness of a community, but render them able to survive any illness, and be the less likely to propagate disease. A certain percentage of secondary scarlatina and return cases was unavoidable, but the number, especially those arising from home treatment, would be greatly reduced were the community to appreciate more fully the infinite advantages of infectious diseases hospitals. They were apt to forget that the seclusion of a patient removes a centre of infection. If diseases are preventable, why not prevent them? had been the remark of an eminent personage. Then there was a necessity of providing these hospitals with convalescent wards, which together with the grouping of all cases, according to the varying stages of the disease, and efficient disinfection of mouth, nasal, and aural cavities, and the patients' effects before discharge, and the issuing of precautions to the patient not to immediately associate with healthy persons, had minimised any possible source of infection and danger arising from secondary and return cases.

Dr. E. M. GOODALL, of the Metropolitan Asylums Board Hospitals, said this was a subject on which he naturally felt strongly, but imperfect disinfection by Local Authorities had something to do with return cases, some of which were also due to those sent out from the hospitals. But it was exceedingly difficult to say when a patient was free from infection. A patient might be sent out in such a condition that it was absolutely impossible to detect anything the matter with him, and yet he might give rise to other cases. He thought there was too much overcrowding at home rather than in the hospitals. Would they prevent return cases by having convalescent wards to the hospitals? His impression was it would not make a bit of difference. So far as any human being could detect, the patients went out free from infection, and it was worthy of notice that they did not get the same number of return cases in regard to diphtheria patients.

Dr. GWYNN, Dr. S. DAVIES, Mr. W. DEFRIES, Dr. WOODFORD, Dr. WILLOUGHBY, Dr. TURNER, Dr. R. DUDFIELD, Dr. ALLEN, Dr. THOMAS, and other speakers having contributed to the discussion,

Dr. MASON replied, and the proceedings closed with the usual compliments.

THE SANITARY INSTITUTE.

WATER-BORNE TYPHOID FEVER AND THE PURIFICATION OF WATER SUPPLIES.

A SESSIONAL meeting of the members of the Sanitary Institute was held at the Parkes Museum, Margaret-street, W., on Wednesday, 9th March. Dr. Shirley Murphy, M.R.C.S., Medical Officer of Health to the L.C.C., presided, and there was a good attendance of members.

Dr. CHRISTOPHER CHILDS, M.A., M.D. (Oxon.), D.P.H., lecturer on bacteriology in relation to hygiene at the University College, read a paper on "Water-borne Typhoid Fever." He said there were three aspects of the subject:—(1) Proofs that typhoid fever is frequently water-borne; (2) ways in which infectious material is conveyed from the patient into water used for drinking; (3) means by which this pollution may be prevented. Ample evidence with regard to the convection of typhoid fever by water was to be found in numerous reports to the Privy Council and to the Local Government Board, in the records of the late Ernest Hart, Dr. Budd, and many other observers. Having examined the nature of typhoid fever poison, Dr. Childs explained the way in which that fever may be conveyed from a patient to other individuals, which were three, viz.:—(1) By contact with the body, clothing, bedding, utensils, and other things which had been polluted with the discharges of the typhoid fever patient, unless care has been taken with regard to cleanliness and disinfection; (2) through the air, coming either from the soil or from drains, sewers, cesspits, or other deposits which had been contaminated with the discharges from typhoid fever patients; (3) through ordinary food, especially drinking water and milk, which had been exposed to air contaminated in the ways mentioned, or had been polluted by deposits, leaking cesspits, drains, sewers, &c., containing discharges of typhoid fever patients. It was probable also that the poison is not unfrequently

CONVEYED BY SHELLFISH

which had been in contact with polluted water, and possibly through ices, watercress, and various other food materials which had not been cooked before being eaten. Authorities differed as to which was the most frequent channel through which the poison is carried. The condition of the soil near and underneath houses might also be an important factor in the production of typhoid fever—a possible source which had not received much attention in this country. In tracing out the origin of attacks they were bound to take all possibilities into consideration, and it was further desirable to make allowance for some possible channel or manner of convection with which we are as yet unacquainted. If in dealing with the complicated problem they were to wait for absolute proofs of the origin and manner of convection, they would remain continuously inactive. Whatever their differences of opinion, if they used the knowledge at their disposal with regard to the causes of typhoid fever they would reduce the mortality from that disease to a minimum—from several thousands per annum to a few hundreds, or even less. If they could ensure notification and isolation, complete disinfection, protection from sewer gas and fæcal emanations, prevention of pollution of soil and water, with organic refuse and typhoid excreta, they would in England and Wales alone save some 4000 lives, obviate prolonged sickness and suffering to some 40,000 persons, and lighten the rates by some hundreds of thousands of pounds. The most important measures for the prevention of typhoid fever were thorough disinfection, correction of insanitary conditions in houses, drains, sewers, &c., protection of the soil and water from pollution, and the protection of our water supplies, was the one measure calling for immediate action. Up to the present time little or no effective attempt had been made to secure a thorough and systematic prevention of pollution of our water supplies throughout the whole kingdom. The Public Health Act, 1875, the Rivers Pollution Prevention Act, 1876, and the Public Health (Water) Act of 1878, were inadequate for securing general protection. We chiefly relied upon water companies and Sanitary Authorities for securing us against the introduction of

POISONOUS MATERIALS

into our drinking water, but under the existing state of the law the obligations of the companies and the powers of the Sanitary Authorities for thorough and constant supervision were so insufficient that we had little ground for confidence. We had adopted the pernicious habit of trusting almost entirely to chemical analysis, and more recently to bacteriological analysis, for detecting pollution, without investigating the surroundings of the source, the tributaries, and the course of the supply, nearly always without inspection and supervision necessary for the prevention of accidental, careless, or wilful pollution of the water. Analyses could only detect the pollution after it has taken place, and as a rule water-borne outbreaks of typhoid fever occur with explosive violence. Combined with thorough and regular inspection of the supply from its source to its distribution, chemical and bacteriological analyses were of great service, for they could indicate pollution which could not be detected by inspection, but if relied upon alone they give a false sense of security. Too often pollution was only discovered by an outbreak of typhoid, and then it was realised too late that expenditure for a proper supervision of the water would have been a safe and wise investment, would have prevented much sickness, loss of life, and loss of money. Dealing with the chief requirements for the prevention of pollution, Dr. Childs contended that the first requirement was thorough, regular, and systematic inspection of the supply from source to distribution, supplemented by bacteriological analyses and expert examination.

STRINGENT REGULATIONS

should be laid upon the water companies, and the Sanitary Authorities should have full powers of inspection of the water supply of their district, whether its sources were within or without the area of their jurisdiction. Wilful or careless pollution of any water supply should be treated as a penal offence. Authorities, representative of the chief interests concerned, should be appointed for each watershed area of the kingdom, with powers to take prompt measures to prevent any threatened pollution, or to abolish detected pollution, and should be responsible for the administration of the laws respecting the protection of water within their dis-

trict. Having referred to the defects of the existing law, he pointed out that one drawback was that the present powers of the Sanitary Authorities were enabling, not compulsory. Considering, too, that Sanitary Authorities were often themselves the greatest polluters, constantly subjected to local and vested interests, and to the incessant cry for the reduction of rates, it was not surprising their administration had not been attended with success. In fact, he could not conceive how, as at present constituted, the Local Authorities could be expected to maintain a constant and complete supervision and protection of our supplies. Nothing could be more obvious than that additional and more effective legislation is required, and the new Acts should be entrusted to an Authority who should be required to carry out its duties without delay, and who should act without fear or favour, unbiassed by local interests and jealousies. It was doubtful whether the County Councils could find time or would take sufficient interest in the enforcements of the Acts.

AN EXCELLENT MODEL

was found in the Lee Conservancy Board, which, whatever its defects, had worked continuously and systematically during thirty years for the purification of the Lee, and had worked with pre-eminent success. Major Flower, of whose work Dr. Childs spoke highly, advocated individual action as compared with action by committee, and he gave several instances relating to the towns of Luton and Hatfield to establish the point. It seemed almost superfluous to bring forward facts and arguments in order to prove the necessity for more effective legislation to prevent the pollution of water. To many it was a constant source of wonder and distress that the attempts at reform had failed again and again, and the cause, without doubt, lay chiefly in the ignorance and indifference of the people. One would have thought that a nation which prides itself upon its general common sense, cleanliness, and high sanitary instinct would have rebelled, and spared neither effort nor expense to prevent the yearly sacrifices of thousands, which is the result of this pollution. The indifference was not from want of warning, for leading sanitarians had never ceased to proclaim the causes of our typhoid epidemics, and the means of preventing them. Appeals to Parliament had been made in vain, and until the people were thoroughly roused from their indifference, until they were made conscious of the disgusting contamination to which our water supplies are so commonly liable, are

CONVINCED OF THE DANGER

to which they are exposed, that remedial legislation would be forthcoming. How could this indifference be overcome—indifference arising from ignorance of the simplest laws of nature and health? Only by persistent and systematic education, and therefore he suggested that the Council of the Institute—one of whose primary objects was to diffuse knowledge relating to sanitary science—should consider a scheme for diffusing knowledge relating to the causes of typhoid fever and the ways of preventing it. Much might be done by encouraging education with regard to the laws of health in schools, and by invoking the aid of the Press, pulpit, and platform. Might not the Conference on River Pollution form a permanent item at the annual congress of the Institute? He had dealt with the subject from a national point of view, the subject of the water supply of the metropolis being too large, complicated and exceptional to come within the scope of the discussion that evening. The demands he advocated on behalf of the protection of our water supplies might seem too large, too exorbitant, too adverse to vested interests, too exacting from the water companies; but he mentioned that if the companies were doing their duties little extra burdens would be laid upon them. As railway companies were responsible for the accidents to their passengers, so it was natural that

WATER COMPANIES SHOULD BE RESPONSIBLE

for the consequences of pollution occurring through culpable negligence on their part. However great these demands might appear, they would sink into insignificance when compared with the results which might confidently be expected from a wholesale abolition of water pollution. In conclusion, he proposed the following resolutions:—

"That the Council of the Institute be requested to consider the possibility of organising and carrying out a scheme for diffusing knowledge with regard to the causes of typhoid fever, and the means of preventing it throughout the whole kingdom."

"That the Council of the Institute be requested to consider the best means for obtaining new and effective legislation for the protection of our water supplies from pollution, whereby it shall be enacted that—

"(1) All Local Sanitary Authorities shall have free access to the water supplies—from source to distribution—which are distributed within their districts, whether the course and source of the water so supplied be within their district or not. That the Sanitary Authorities provide for the thorough and regular inspection of the water supplies distributed within their districts, and for the regular analysis of such water, as often as may be deemed sufficient, and that the results of such inspections and analyses shall be regularly recorded and published.

"(2) That the waterworks companies shall prepare and publish records of their water supplies, such records containing a full account of every source and tributary of the water supply, and a full account of all reservoirs, conduits, filter-beds, mains, and pipes by which the water they supply is collected, stored, or conveyed to the houses supplied; such records also being fully illustrated by maps, plans, and sections, showing the relation of all houses, drains, sewers, cesspits, and all deposits of organic refuse in the immediate neighbourhood of any part of the water supplied by them, and that all such maps, records, plans, sections, &c., shall be freely accessible for the purposes of inspection to the Sanitary Authority within whose district the water is supplied, and to every customer of the waterworks company.

"(3) That the waterworks companies shall be required to make regular, constant, and thorough inspection of all parts of the water supplied by them—from source to distribution—with a view to preventing wilful, careless, or accidental pollution; also to make regular analyses of the water supplied by them, so often as may be considered necessary, and to make and publish reports of all such inspections and analyses.

"(4) That the waterworks companies shall be made responsible for the consequences of the pollution of the water supplied by them, if such pollution could reasonably have been prevented.

"(5) Wilful or careless pollution of any water supply shall be regarded and treated as a penal offence.

"(6) That Authorities, representative of the interests concerned, be appointed for each watershed of the kingdom, who shall have the general care and supervision of the waters within each respective watershed ; shall take prompt measures to prevent any threatened pollution, and to arrest any detected pollution of any water ; and shall be responsible for the due and effective administration of the laws respecting the protection of water within their districts. (Applause.)

Mr. E. WHITE WALLIS read a letter from Dr. Sims Woodhead, who expressed concurrence with Dr. Childs, that typhoid fever is frequently waterborne, but pointed out that in water the typhoid bacillus was at a distinct disadvantage. It was only when there was a constant and recurring infection that there is anything like epidemic form. Experiments showed that the bacillus lived for much longer periods in the soil than in water. For this reason it was necessary that although the utmost care should be exercised in regard to the examination of every water supply, still greater care should be exercised in making examinations on the collecting grounds, and also of the ground in which the pipes and mains are laid. At present there appeared to be a kind of natural antagonism between Sanitary Authorities and water companies, which might be readily understood when it was remembered that the bias of the two sets of men was diametrically opposed. But it was right that the Sanitary Authority should be able to impose certain restrictions on the companies, though it was to be remembered that very often Sanitary Authorities themselves were often great sinners in the matter of the pollution of water supplies. It was hardly to be expected under present conditions that just bye-laws would be held by Local Authorities unless they were made responsible for collecting areas, or some Central Authority had power to come to them with advice and control whenever matters of dispute arose. He could not help feeling that Major Flower was right when he suggested that compulsory powers should be obtained to deal with many of these matters. It was to be remembered that many water companies had to work under very great disadvantages, being frequently in the position of having to make bricks without straw, while in many instances they had to rely on outside and unofficial advice for their knowledge of the advances of bacteriology and chemistry. What struck him was that the time had now come for the formation of some central board of advisers, and of appeal to which water companies, whether public or private, or a Sanitary Authority, might apply in matters concerning improvements and alterations, and to whom also consumers might appeal in cases where they are not satisfied with the present condition of any water supply. If to such a board compulsory powers could in any way be given, there was little doubt that a considerable step would be made towards the solution of an exceedingly difficult and important problem.

Major LAMOROCK FLOWER, engineer to the Lee Conservancy Board, thanked Dr. Childs for his references to himself, and contended that after many years' experience, the way to get rid of pollution was by individual, rather than committee action. Twenty-seven years ago he had been given a free hand, which he still retained, but where interference had taken place with himself in his duties there, failure had to be recorded.

Dr. LOUIS PARKES seconded the resolutions proposed by Dr. Childs, and said that after the publication of the Local Government Board report on the Maidstone epidemic, the Council of the Institute might see its way to getting a strong deputation to the Local Government Board with regard to the necessity for taking action in regard to safeguarding the public water supplies of this country. With regard to Dr. Woodhead's letter, it always appeared to him that though the typhoid bacillus might not live long in reservoirs or rivers, it was possible that this might not be the case in dark mains and cisterns. Perhaps there might be some evidence taken on this point at the Maidstone inquiry.

Professor J. LANE NOTTER, Dr. RIDEAL, Dr. NEWSHOLME, Mr. J. A. WANKLIN, Dr. R. DUDFIELD, Mr. WOLFF DEFRIES having spoken,

The CHAIRMAN said he was afraid the great difficulty underlying the whole question was that human nature is not always to be relied upon. One had to design one's machinery in such a way that the frailty of human nature can be the least capable of inflicting injury. It seemed to him that there was one broad principle that ought to underlie the water supply to communities, *e.g.*, that it should not be supplied for profit. The moment they introduced a supply for profit, whether it were by company or Sanitary Authority—he was afraid that some Sanitary Authorities must be definitely accused of trading in water—the community was exposed to risk. Water was a necessity, and it ought to be supplied in a fit condition for its purpose, and it ought to be supplied without profit at the lowest price that the community can pay for it. The moment it became a trading concern difficulties arose, and that was the point they ought to bear in mind, and which he should be very glad to think that the attention of the Legislature would be directed to, for he believed that Sanitary Authorities were indulging in the habit of trading in water, and were guilty of a course of action prejudicial to the interests of the community.

The resolution was then agreed to *nem. con.*, and a hearty vote of thanks was passed to Dr. CHILDS, who briefly replied to some of the points raised in the discussion.

On the proposition of Professor NOTTER the usual compliment was accorded to the Chairman, and the proceedings closed.

LOCAL AUTHORITIES AND SLAUGHTER-HOUSES

THE Scotch Local Government Board has just issued a circular to Local Authorities of landward districts directing their attention to the provisions of the new Public Health Act with regard to slaughter-houses, and recommending every Local Authority within whose district a slaughter-house exists or is proposed to frame bye-laws under the Act, supplying also a form of bye-laws for adoption. The matters which may be regulated by these bye-

laws are :—The conduct of the business, and the structure of the premises in which it is carried on —the object in both cases being to prevent or diminish the noxious or injurious effect of the business. The bye-laws may also regulate the mode in which the application for the sanction of the Local Authority to the establishment of the business is to be made. No power is given to make bye-laws as to the situation of slaughter-houses. The intention of the Act obviously is that the Local Authority should satisfy themselves regarding the suitability of the site before giving their sanction to the establishment of the business or granting a licence for the premises.

The following requirements ought to be insisted on :—Neither the slaughter-house nor the lairs for cattle in connection therewith should be within 100ft. of any dwelling-house, and the site should be such as to admit of free ventilation. The slaughter-house should not in any part be below the level of the adjoining ground, and there should be provision for effectual drainage. An adequate water supply should be provided, and should be so arranged that the walls, up to a height of 6ft., may be washed by means of a hose. There should be no habitable room or loft over the slaughter-house or lairs. Although the Act authorises the making of bye-laws for the structure of the premises, the Board think that Local Authorities will find it advisable to deal with the structure in the manner suggested for dealing with the site. The Local Authority should either see that the structure is suitable before they give their sanction, or should only give their sanction on the applicant coming under an obligation to make the structure suitable within a specified time. The Local Authority of any landward district, either singly or in combination with other Local Authorities, is authorised to provide a public slaughter-house, and to borrow for that purpose on the security of the Public Health general assessment and of the rates or dues leviable by them for the use of the slaughter-house.

The provisions as to sanction and annual licence, and as to advertising the intention to apply for the same, appear to be applicable in the case of a public slaughter-house as in other cases, and there will be a like appeal to the County Council and to the Board as in other cases. If the Local Authority are careful in giving sanction only where the situation, construction, and sanitary arrangements of the premises are satisfactory, and if they frame and enforce suitable bye-laws, and carry out efficient inspection, it is not probable that nuisance will arise in any slaughter-house within their district. But if nuisance should arise, the fact that the business has been established with the sanction of the Local Authority, and that the premises are duly licensed in terms of the Act, will not prevent the Local Authority taking proceedings to have the nuisance removed.

WATER ANALYSIS AT MAIDSTONE. — The Somerset House report in the disputed analysis case was received on Tuesday last, and was to the effect that "there were grounds for believing the water was not liable to contamination, and that its use for potable purposes was not likely to prove injurious to health." The Bench refused to make an order to close the well, and dismissed the case.

Sanitary Inspectors' Associations.

SOUTH WALES AND MONMOUTHSHIRE.

A SPECIAL meeting of the Association was held in the Town Hall, Cardiff, on Saturday afternoon, March 5th. In the absence of the President (Dr. Williams, Medical Officer for the County of Glamorgan), who is indisposed, Dr. Walford, Cardiff, Vice-president, presided. There were also present Dr. Herbert Sims (Hon. Treasurer), Mr. W. Fraser (Chairman of the Council), Messrs. W. Lloyd Marks and D. Vaughan (Vice-chairmen of the Council), together with a large attendance of members, including Messrs. E. A. Leyston, Spencer E. Jones, Llewellyn Davies, David Jenkins, James Jones, W. John Hughes (members of the Council), &c., the Honorary Secretary, Mr. J. Towy Thomas.

The following gentlemen were elected hon. members of the Association :—Dr. T. J. Dyke, M.O.H., Merthyr; Dr. Evan Evans, M.O.H., Llanelly, Carmarthen; Dr. G. H. Brown, M.O.H., Brynmawr; Dr. E. Garrod Thomas, Llytha Park, Newport; Dr. W. E. James, M.O.H., Abercarn; Dr. Trafford Mitchell, M.O.H., Gorseinon; Mr. W. J. Jones, Surveyor, Rhondda Urban District Council; Mr. D. W. Jones, Solicitor, Chairman Health Committee, Merthyr; Alderman Thomas Jones, Chairman Sanitary Committee, Newport.

Mr. M. Roderick, Road and Sewer Inspector, Rhondda Urban District Council, was elected an associate; and Mr. John Powell, Surveyor, and Chief Sanitary Inspector, Pontypool, a member.

Messrs. Llewellyn Davies (Swansea), and T. W. Warren (Cardiff), were elected scrutineers; and Messrs. E. A. Leyston (Barry), and D. J. John (Pontypridd), auditors, for the ensuing year.

The important work of the meeting was to discuss the best means of promoting "The Sanitary Inspectors' Superannuation Bill," &c.

The following resolution was passed, "That this meeting of Sanitary Inspectors unanimously presses its claims upon members of Parliament to support "The Sanitary Inspectors Appointment and Superannuation Bill, 1898," to be brought into Parliament during this session, as the only means inducive to render effectual assistance to carry out sanitary administration which the Legislature had in view in passing the "Public Health Acts."

Deputations were appointed to interview all Members of Parliament within the area of the Association, with the view of getting them to support the measure. The President, Treasurer, and Secretary were appointed to proceed to London on the day when the Bill would be introduced into Parliament, and interview the various members referred to, so as to secure their votes in favour of the Bill.

NORTH-WESTERN AND MIDLAND.

THE thirteenth meeting of the session was held on Saturday last at Liverpool. An interesting paper on "Public Health Problems" was read by Mr. Ernest Worrall. Owing to the great pressure on our space, we are compelled to postpone the report until next week.

NATIONAL REGISTRATION OF PLUMBERS.

MEETING AT BRADFORD.

THE annual public meeting of the Bradford District Council, in connection with the National Registration of Plumbers, was held on the 9th inst., at the Technical College, Bradford. Mr. Charles France (architect), presided, and was supported by Ald. Richard Hind (Master of the Plumbers' Company), Dr. Evans (Medical Officer of Health), Mr. James Watson (City Waterworks Engineer), Mr. J. H. Cox (City Surveyor), and Mr. F. W. Richardson (City Analyst).

Dr. EVANS, in seconding the adoption of the report, said that the work of registration was certainly progressing. He hardly needed to point out the value which all sanitarians attached to the efficiency of plumbers' work. It was very often the scamping of plumbers' work, or the employment of unqualified people, which was the cause of the preventible diseases which were the scourge of communities. He hoped the Bill for the Registration of Plumbers would have better fortune than it had previously had.

Alderman HIND said he was very glad to see the names of two Medical Officers on the list of public representatives of the Council, for much of the sanitary progress of any community depended upon the interest of these gentlemen. He acquiesced in Dr. Evans' expression of the hope that the Plumbers' Registration Bill would meet with a better fate this year than it had hitherto experienced. It was admitted on all hands that much of the preventable disease of the country was caused by bad plumbing work inside the house, and it was therefore regarded as most important that some provision should be made whereby any person who wanted to employ a plumber should be able to know whether or not the person whom he had in view had had the necessary and proper training. Speaking of the Plumbers' Company, he said that though for a time it had passed out of the hands of the plumbers, it was now interesting itself in the trade in a very practical way.

Mr. JAMES WATSON proposed a resolution "That this meeting reaffirms the desirability of the speedy passing into law of the Plumbers' Registration Bill." He said he had had something to do with the initial stages of the registration of plumbers in Scotland, for he was convinced that the plumbers very largely had control of the public weal, especially in congested communities. He contended that it was the bounden duty of Parliament, whose first object should be to see to the public health, to give the qualified plumber a status and standing by registration in order to encourage him to do his best for the community in which he lived.

Mr. F. W. RICHARDSON, City Analyst, then delivered a lecture on "Microbes and Sanitation," in which he described and illustrated the nature of microbes, the poisons formed by disease germs, the causes of the various preventable diseases, the conditions favourable to diseases and epidemics, the influence of filth, bad water supplies, and defective plumbing, and the importance of sanitation generally in regard to disease.

Votes of thanks to the chairman, the lecturer, and Alderman Hind closed the meeting.

Institute of Sanitary Engineers

THE SANITARY ADMINISTRATION OF BELFAST.

(*Continued from page* 261.)

(12) With regard to these water-closet regulations it may be pointed out that the Belfast Water Commissioners, a separate elective Trust, have, in addition to their water-waste regulations, a set of sanitary bye-laws upon these points, if anything, more stringent than those of the City Council. I am not aware that the double supervision arising from this has led to friction, or to a more careful inspection falling to the ground, as it were, between two stools.

(13) In the case of privies, which are, however, as far as possible discouraged, they, nor the ashpits under them, must not be nearer than 4ft. to any house, and—

(14) Not to be nearer than 5ft. to any domestic water supply.

(15) No ashpit, &c., to be allowed which would necessitate removing its contents through a dwelling-house.

(16) All privy-pits must allow of dry ashes being mixed with the other contents.

(17) And all ashpits must be covered from the rain, ventilated, and have impervious bottoms above the level of the yard. Pits for ashes only may approach no less than 2ft. from a dwelling-house, and 3ft. from a domestic water supply.

(18) As all are now cleaned out by the public scavengers at the public expense, they must communicate either directly or through an open yard, with a back lane.

(19) For many years no street has been permitted of less than 30ft. in width, and every street not passed before, I think, 1886, must have a back lane at least 9ft. wide (before that time back lanes were permitted 4½ft. in width).

(20) Every yard must contain, free of all covered buildings, a clear superficial area of 100 square feet, and otherwise of suitable dimensions. This, with the 9ft. back lanes, ensures a very good circulation of air round all houses, especially as by far the great bulk of working-class dwellings consist of two-storey four-roomed houses.

There is an interpretation, which I do not think can be borne out by the Act, that all yards to dwelling-houses must be upon the ground level, a regulation in general highly proper and convenient. There are, however, a limited number of cases, in connection with business premises, and mainly in the central parts of the city, where a strict adhesion to this rule, which is nevertheless enforced, does not seem to be desirable. There are many premises in the city, originally built for and well adapted in every other respect, as dwellings, and even of a comparatively high class, in which, through the extension of business, it has been found necessary to encroach upon the original yard space. Were it not for the adhesion to "red tape," a commodious yard of iron and concrete could be formed at what is really the dwelling-house level, and the salubrity of the premises be enhanced rather than suffer thereby. In justice to town officials, both in Belfast and, from my knowledge of other places, I cannot wonder they should cling as closely as

possible to stereotyped regulations. They are always the servants of a Corporation, elected at frequent intervals upon a popular franchise, and after giving citizens and their representatives alike full credit for honesty and public spirit, there yet remains room for the display of a large amount of "human nature," and a public officer is daily subjected to pressure from more or less influential quarters to render some regulation or other just a little more elastic in the applicant's most particular case.

No wonder they think that safety lies often in a rigid *non possumus*. Nevertheless, this need not prevent a judicious revision sometimes of rules, admittedly made in the first instance for the public benefit. The yards case, I think, may be one of these.

I may here remark that in Belfast the City Surveyor's department hold in practice that their duties of supervision cease as soon as the work has been completed, and that after it has passed their inspection further control should rest with the Public Health or some other department. This is only natural, though of course they hold themselves at liberty, at whatever time a breach of their regulations may be discovered, to take action with regard to it. In point of fact, persons building in the city have to give in all cases a written adhesion to a long list of printed sanitary regulations, drafted in the spirit of the foregoing, and also in many instances plans are not allowed to be passed until special undertakings have been given upon various sanitary and other matters.

Whilst the primary object of the Surveyor's department is to deal with new buildings, and its inspection is confined in the main to the task of seeing these properly carried out, the Public Health Department has its chief work in dealing with the existing condition of things, so far as the health of the community is affected by them. The work of inspection necessarily, therefore, occupies a position of much greater relative pre-eminence than in the Surveyor's department.

I may perhaps, in commencement, summarise the more important items of the bye-laws which the department has to give effect to, but in doing this it will be hardly necessary to mention all the Acts of Parliament which it administers, most of them being public Acts more or less familiar to you all. The first I deal with is

Lodging Houses.—These are (1) to be swept daily and washed out weekly; (2) notice to be given in case of infectious disease, and for disinfection; (3) proper water supply and accommodation for washing is to be provided; (4) there are rules as to absence of hangings and style of beds; (5) also rules as to separation of sexes.

Seamen's Lodgings.—There are separate bye-laws for these, in the main similar to the foregoing, but rather more strict. There also seems to be a power of inspection, and for making orders under the Medical Officer of Health, not mentioned in the former bye-laws. Taking into consideration the character of most common lodging-houses, I am rather of the opinion that, instead of weekly, they should be washed out twice a week at least, and should be lime-whitened twice a year.

Cowsheds and Dairies, &c.—Under the powers of the Contagious Diseases (Animals) Acts, 1878 and 1886, and the "Dairies, Cowsheds, and Milkshops Act, 1886," a set of bye-laws has been framed. (1) Cattle sheds must be "well lighted, drained, and ventilated;" (2) there must be a proper supply of water; (3) floor to be properly paved to avoid saturation; (4) space for each cow, 6ft. by 3ft., in addition to passage, &c.; (5) or equal at least to 400 cubic feet for each; (6) no entrance through dwelling-house, or passage for manure or animals through the same; (7) the yard to be properly paved; (8) proper dung pit, and the manure not to lie more than two days at a time, and provision for disinfection in case of disease; (9) all places to be swept and cleaned *twice* a day, and lime-washed twice a year. This latter provision is not enough. The Tramway Company whitewash their stables monthly, and the health of milch cows is of more importance surely to the community than that of tram horses! yet philanthropists are always crying out about the latter because they are in evidence, whilst dairy cows are for the most part out of sight; (10) no pigs to be allowed, or at the least they must be 20ft. distant; (11) all dairies and milkshops to be cleaned daily, and the vessels twice a day; (12) no cooking, meals, sleeping, or food taken in places devoted to the sale or storage of milk; (13) there are rules as to disease and closing if necessary; (14) also as to exclusion of persons having disease from contact with animals, or from such places.

Piggeries are under a separate set of bye-laws:—(1) Neither pigs or their manure are allowed to be within 15ft. of a dwelling house; (2) must be properly drained, and the floors asphalted or concreted, so as to prevent any soakage into the soil, and to allow of their being properly washed out; (3) there must be a proper manure pit (not sunk), and properly drained to a tank which must not be in connection with the public sewers; (4) the manure must be removed at least once a week, but *not* through a house; (5) must be lime-washed six times a year.

The consideration of these rules regarding animals suggests several questions for answer. One that obviously arises first is as to the propriety of allowing cows to be kept at all within the city bounds. The condition of a milk-giving cow perpetually shut up within walls does not seem a natural or healthy one, yet as this climate, with its absence of pasture in winter, and the general inclemency of that season, almost necessitates all cattle being under cover for nearly half the year, there is some difficulty in enforcing a change. Moreover, in the present condition of dairy farms in the country the exchange would, more often than not, hardly be an advantage from a sanitary point of view, and whether under Boards of Guardians as at present or under some future County or District Council, however intelligent, circumstances for some time to come would scarcely permit of inspection in the country being as strict as it is possible for it to be in a town. Whether in our own case that inspection is as strict as it ought to be is at least debateable. The enforcement of the rule, for instance, as to cleaning twice daily, just as in the washing of milk shops and their vessels, and of lodging-house floors, would require a whole army of Inspectors to see carried out with absolute certainty. Officers must obviously be content with such apparent compliance as may be suggested by the state of the place upon inspection. There might, however, be a greater strictness as to the condition of the floors. I have seen patches filled up with pebble stones in an uneven

and sunken condition, in which undesirable liquids could lie, and no doubt permeate the subsoil. Why also should not the same rule apply to piggeries, and nothing be allowed but asphalt or concrete? Again, why is the more important cow-house to be whitewashed only twice a year as against six times for the pig-sty?

Those who note the signs of the times will be ready to believe that we may be upon the eve of great changes as regards our milk supply. In this respect Denmark and some other countries are very much in advance of our own. Membership of an Institute such as this presupposes at least an elementary knowledge of bacteriology, and of dissemination of disease by means of the all-pervading microbe. Not alone typhoid and diphtheria, the infection from which can be guarded against by comparatively simple precautions, but tuberculosis is very readily conveyed through milk, and the latter is now recognised as especially the disease which pertains to houses. It is admitted that a very considerable percentage of dairy cows are affected with tuberculosis, and that much of that disease in the human subject has probably been conveyed by this means, and it is especially likely to be so where it has attacked the intestinal organs, as it so frequently does in young children; yet, except in the most general way, the law, either national or local, does not recognise, and takes no special precautions against this. It is now known that milk is also affected by micro-organisms in many other ways, in which its use, although not so far as is yet known, communicating any specific disease, must render it more or less injurious as an article of diet. It seems therefore quite clear that the keeping of cows and the distribution of milk require to be placed under much more stringent regulations than has yet been the case. For instance, the space occupied by dairy cows, whether in or out of town, should be very largely increased, as four hundred cubic feet seems a very inadequate allowance for so bulky an animal as the cow.

Then again, attached to every byre, where the cows are not actually at grass, should be a large yard, fully open to the air, but in part, at least, covered, into which it should be compulsory for them all to be turned for the greater part of the day, and subject to the same rules for cleanliness as the house itself. I would hope in time to go a step further, and to see at least the udders and the adjacent parts of the cow washed before each milking, and the cows groomed like horses at least three times a week, if not daily. Finally, that all milk supplied to the public should be first sterilised, and be delivered in closed cans or other suitable vessels. It may be urged, and with some show of reason, that the compulsory adoption of these measures would so enhance the cost of milk as to render its use all but prohibitory to the very poor. That it would somewhat increase the cost is pretty certain, but I doubt whether to so great an extent as might at first be imagined. It is astonishing how we find that new methods and appliances, which, when first introduced, were costly in the extreme, become, when once they are universally adopted, and therefore applied upon a large scale, as cheap as they formerly were dear. The community at large would, in the long run, probably be the saver by the diminution of the loss occasioned by death and disease. The working classes, too, who have benefited in an infinitely greater proportion than the classes above them by the cheapening during recent years of the national food supply, may well be asked to pay a little more to ensure safety in the use of one single article, the risk attaching to the use of which is neither trifling nor imaginary.

It is the members of the working class, however, with their control of votes, who will ultimately have to decide these questions for themselves. Our place for the present is so to formulate, and then form, such a healthy public opinion as shall permeate in every direction through all classes of society, so that, when the time comes, the majority shall be willing to decide these sanitary matters in a far-seeing manner for their true interest.

In regard to the bye-laws as to keeping of pigs, by far the easiest way for the Authorities would be to prohibit their being kept inside the town at all, because every poor person who has a yard a little larger than ordinary wants to keep one or two therein, and the proper supervision of all these must be one of the most troublesome parts of an Inspector's work. Nevertheless, to forbid them altogether would raise a terrific outcry, and the regulation merely has often been the source of friction. There is besides a very large amount of refuse food that would otherwise go to waste, or else be disposed of through some other channel, not perhaps altogether an undesirable change, because to judge from the character of much of the refuse one sees gathered up for this purpose it must often be unfit for use. Nevertheless, as all pigs' food is in Ireland cooked before using, perhaps the risk may be less than at first sight would be suspected, as a thorough boiling is an excellent germicide. Of course, too, the removal at very short intervals of so much household refuse prevents the accumulation in the ashpits of a quantity of stuff that would otherwise be liable to putrefaction, and is to that extent an advantage.

Perhaps the easiest way of checking the keeping of pigs in back yards would be to somewhat enlarge the area in which they may be kept—say, to 20ft., at least, from any dwelling-house.

(*To be continued.*)

NEW LAVATORY APPLIANCE. — Mr. J. N. Maskelyne, of the Egyptian Hall, has just invented another little contrivance for use with his registering locks, or for other purposes. It consists of an indicating door latch principally for use in lavatories. One of the objections hitherto in this class of article is that the whole of the word "Engaged" does not always show. In Maskelyne's indicator this is overcome by an ingenious device, the door not being properly fastened until the whole of the word "Engaged" appears in the opening. Another advantage is that the door can be opened from the outside with a key, in cases of emergency, and the indicator can be set to "Engaged" by the attendant, should the visitor neglect to do. The manufacture of the article is in the hands of Messrs. Thorpe and Salter, engineers and contractors, Red Lion-street, Clerkenwell, who are also the makers of Maskelyne's automatic and registering locks, which we see at all the principal lavatories in London and provinces.

General News.

SITTINGBOURNE.—It appears that steps will have to be taken shortly to procure a more adequate water supply.

LOUGHBOROUGH.—Additional water mains, at a cost of £1400, and other improvements in the water supply are contemplated.

SEVENOAKS.—The Sanitary Committee of the Urban District Council is considering the question of providing a public slaughter-house.

WEST HAM.—The Guardians have resolved not to institute any more prosecutions of parents for refusing to have their children vaccinated.

SUTTON-IN-ASHFIELD.—The District Council has decided to ask the Medical Officer, Dr. Nesbitt, to prepare a report on the cases of typhoid fever at Forest-side and New Cross.

LUDDENDEN, WARLEY, AND MIDGLEY.—The Urban District Councils of Luddendenfoot, Warley, and Midgley have requested the Halifax Corporation to supply their districts with water.

ECCLES.—The Town Council has resolved to apply to the Local Government Board for £1500 for the erection of a boiler-house and laundry, and for improvement at the Public Baths, Patricroft.

ROCHFORD.—The local scheme for providing a much-needed supply of water has been abandoned by the Council, as the quality of the water does not commend it to the approval of the Local Government Board.

WITHINGTON.—An important Local Government Board inquiry was opened on Thursday, the 10th inst., into an application made by the Urban District Council for sanction to borrow £5500 for the purchase of Baguley Lodge Estate as a site for an infectious diseases hospital.

LITTLEHAMPTON.—The Urban District Council met in committee on Thursday, the 10th inst., at the town offices for the purpose of considering a special report as to the proposed new water supply. The present supply during the summer months barely suffices for the needs of this promising town.

ILFORD.—At a recent meeting of the Urban District Council a letter was read from Mr. J. McCowan, Lord Salisbury's agent, stating that his Lordship was prepared to sell two acres of land at Ilford, at £600 an acre, as a site for houses for the working-classes. The letter was referred to the committee who had the matter in hand.

RETFORD.—The Local Government Board, with reference to the Mattersey water supply, has recommended that a scheme should be adopted which would include the parish of Mattersey Thorpe, and it has been resolved by the Rural District Council that Mr. Fenwick, the engineer, be instructed to prepare a plan for such a joint scheme.

CHELTENHAM.—The Town Council have decided to purchase the Baths for the sum of £2600, subject to the sanction of the Local Government Board for the necessary loan for the purchase-money, and for such alterations as may be decided on being obtained, and the Borough Surveyor has been instructed to report as to the best mode of converting and altering the Baths.

WITTON GILBERT.—A Local Government Board inquiry has been held *re* the borrowing of £900 for water supply.

YORK.—The Corporation has applied to the Local Government Board for sanction to borrow £2500 for hospital purposes.

LUTON.—The borough surveyor is preparing plans, estimates, &c., for an isolation hospital to be erected at a site near Spittlesea Cottage.

MANSFIELD WOODHOUSE.—The Urban District Council has applied for the Local Government Board's sanction to a loan of £3000 for carrying out the waterworks scheme.

TOTTENHAM.—The Urban District Council has received a communication from the Local Government Board forwarding sanction to the Council borrowing £1500 for the extension of the water mains in the district.

MELTON MOWBRAY.—At a recent meeting of the Waterworks Committee the Surveyor reported that Mr. Baldwin Latham had inspected the proposed new sources of water for the town supply at Scalford and the vicinity. The results of the gauges taken during the last nine months were stated to have been highly satisfactory, and it is confidently anticipated that a more than adequate supply will be forthcoming.

TRURO.—At a monthly meeting of the City Council held last week it was decided to adopt the recommendation of the Chief Inspector of Nuisances, Mr. Herbert E. Bellamy to purchase and maintain their own horses and carts for the purpose of the removal of house refuse and street sweepings. A report was also presented and read by Mr. Bellamy upon the condition of the public wells within the city, and in which he says that out of twenty-three examined only five could be passed as satisfactory, and no less than sixteen if allowed to be continued would be required to be lined with brickwork set in cement, and backed with puddled clay from the top down to the impervious stratum or shelf, and sundry repairs to be done to three, which would amount to about £350. After a long discussion the report was adopted and the amount sanctioned.

Personal.

MR. G. R. GREEN has been appointed Medical Officer of Health for the city of Ripon.

MR. W. K. BAKER has heen appointed Inspector of Nuisances for the borough of Chelmsford.

MR. F. G. SMITH has been appointed Medical Officer of the Stockton workhouse and district.

MR. A. M. WATTS has been appointed Medical Officer for the first district of East Ashford union.

MR. F. A. WINTER has been appointed Inspector of Nuisances for the urban district of East Cowes.

MR. G. HOPE has been appointed Medical Officer of Health for the urban district of Hanwell.

MR. J. WINTER DRYLAND has been reappointed Medical Officer of Health for the urban district of Kettering, at a salary of £50 per annum; and Mr. John Barrit has been reappointed Inspector of Nuisances, at a salary of £120 per annum.

Mr. W. E. James has been appointed Medical Officer for the Mynyddislwyn district of Newport union.

Mr. O. B. Trumper has been appointed Medical Officer of Health for the urban district of Market Rasen.

Dr. Greatbatch has been appointed Medical Officer for the burgh of Montrose in room of Dr. Lawrence.

Mr. H. C. Darby has been appointed Medical Officer of Health for the urban district of Lye and Wollescote.

Mr. Robert Young, the Gas Manager at Laurencekirk, has received the appointment of Gas Manager at Lockerbie.

Mr. W. M'Whirter, M.I.E.E., Aberdeen, has received an appointment in India, to carry out a new system of electrical train signalling.

Mr. T. G. Taylor, Borough Surveyor of Douglas, Isle of Man, has been selected for the vacant post of Surveyor to the Borough of Ramsgate.

Dr. C. B. T. Musgrave has been appointed Medical Officer for the Cromee district, and Mr. H. C. Dent Medical Officer for the Northrepps district of Erpingham union.

Mr. Walter Blackshaw, A.M.I.C.E., has resigned his position as Chief-Assistant in the Croydon Borough Surveyor's Department, and take up a new appointment as Surveyor to the Urban District Council of Cannock.

Sewerage Schemes.

[To Municipal Engineers and Surveyors.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

Spring Vale sewer, Whitby, is to be extended at a cost of £468.

The Thurnscoe Urban District Council is considering plans for sewage and water schemes.

The Local Government Board has sanctioned the borrowing of £485 for sewerage works at Seaford.

The Andover Corporation has engaged Mr. White, of Oxford, to prepare plans for the drainage scheme.

The Heanor District Council has decided to apply for an additional loan of £2000 to carry out alterations required in the sewerage scheme.

At the last meeting of the Roundhay and Seacroft Rural District Council, the Clerk was instructed to apply to the Local Government Board for permission to borrow £15,000 for sewers and sewage disposal works at Roundhay, and £3840 for sewers and sewage disposal works at Seacroft.

The new sewerage scheme which the Bakewell Rural District Council has decided to construct for Tideswell will cost from £4000 to £4500.

Referring to the borrowing of £3000 by the Yelverton District Council for purposes of sewerage and sewage disposal, the Local Government Board has requested, before granting the application, to be furnished with certain plans.

The Special Committee of the St. Andrews Burgh Commission has appointed a Sub-committee to consult with Mr. Henry Bruce, C.E., as to the construction of an interceptor intended to remedy the complaint as to certain portions of the sewage.

The Chailey Urban District Council has instructed its clerk to make application to the Public Works Loan Commissioners for the balance of the loan of £1300 which they had agreed to advance to the Council in respect of the drainage of the village of Newick.

The scheme for the sewerage of the village of Kibblesworth is now approaching completion. The contract is being carried out by Mr. J. Carrick, of Durham. Hitherto the village has been drained by open brick channels, which were offensive and unsanitary.

At a special meeting of Moffatt Burgh Commissioners held to decide upon one of three systems of sewage purification as reported on by Mr. T. O. Niven, C.E., Glasgow, it was resolved to adopt the system known as Mr. Dibdin's or the Sutton system. The total estimated cost of introducing this system of sewage purification is £2350.

With reference to the application of the Berkhamstead Rural District Council to borrow £11,000 for the works of sewerage and sewage disposal for the parishes of Berkhamstead and Northchurch, the Local Government Board has sanctioned loans of £4928 and £2022 for the proposed new works, and of £2628 and £1072 for the reconstruction of defective sewers.

Important and necessary improvements are being proceeded with in the vicinity of the Marquis's Bridge on the County Down side of the Lagan. An important reclamation of ground has been made, a sea wall being erected that causes the river to flow in its natural bed. In this reclaimed ground, which covers a considerable area, new streets are already laid out for building purposes. Considering the large increase of buildings already completed and the increase of population of Ballynafeigh, it was deemed necessary by the City Council to divert the sewage of that locality from being emptied into the Lagan. At the present time a wonderful change is taking place which will be highly appreciated by the inhabitants whose dwellings border on the Lagan, viz., the making of a large sewer right across the park. This sewer will be joined to the main drainage sewer at Ravenhill-road, the works at present being rapidly proceeded with by the contractor.

A Local Government Board inquiry has been held at Skipton into an application of the Urban District Council to borrow £1200 for the Broughton-road sewerage scheme, and a further application to borrow £400 for a new steam fire engine and appliances. There was no opposition to the applications. The Inspector stated, with respect to the sewerage scheme, that duplicate pumping arrangements would be insisted upon.

The Local Government Board has written the Otley District Council refusing to sanction the loan of £4000 for improving the sewage disposal works, and stating that owing to the admission of trade effluents into the sewers, especially that from the Wharfedale Paper Mills, the disposal works are quite insufficient to deal with the volume of sewage brought to the outfall, and the land in use for the treatment of the effluent is thoroughly water-logged, and at present unfit for the purpose.

The Lizard sewage outfall business being settled, Helston Rural Authority has decided to accept Lord Falmouth's proposals, except the one that the Council should pay the whole of the costs incurred by his lordship's solicitors, who are to be asked the amount of those costs, and what they are for. The Clerk will take steps to borrow a sum not exceeding £500 for carrying out the works, while Lord Robartes and Lord Falmouth are to be appealed to for a contribution towards the expense of the scheme.

A meeting was held at Manchester on Wednesday, the 9th inst., of the Special Sub-committee which was appointed by the Rivers Committee in November last, owing to the rejection of the culvert scheme, to inquire as to the best method of sewage purification. The members of the Sub-Committee have visited a number of towns and inspected various systems of sewage disposal, and it is understood that their report—which was finally approved at Wednesday's meeting—will be, in effect, a recommendation to the City Council to adopt land filtration on what is known as the biological system. There are various estimates of the cost of carrying this out, generally much below the expenditure which the culvert scheme would have involved.

Probably by far the most important public project ever undertaken in New Orleans is the drainage of the city, which is now under way. Five years ago the proposition for a complete drainage system was first broached, and an advisory Drainage Board was created, a preliminary survey made of the city, and a plan of drainage prepared. The present system is very unsatisfactory. It renders the city easily susceptible to rain overflows, makes the soil and the climate damp, it affects public health unfavourably, and increases the death-rate. The Legislature, in response to the prayers of the people, created a Drainage Commission, and gave it full power over the drainage system, with the right to issue bonds. The Drainage Commission advertised the contract, and it is now settled that a company will do the entire work, operating the pumps and other machinery by electricity, for little over £200,000.

The Local Government Board has written the Market Harborough District Council with respect to the application to borrow £3550 for sewerage works at Kibworth, advising the amendment of the scheme in certain details, stipulating for the return of the plans, and an estimate of the cost under the amended scheme; also, that the consent of the railway company be obtained for the construction of the sewer underneath the gasworks.

Lighting.

At a recent meeting of the Glossop Town Council, a notice of motion was given that the Council apply to the Board of Trade for a Provisional Order empowering the Corporation to supply electric light in the borough.

The Lighting Committee of the Sunderland Corporation has decided to recommend the Town Council to apply to the Local Government Board for a loan of £26,000 in connection with the proposed electric lighting extensions.

The Urban District Council of Prestwich has adopted a resolution of the Electric Lighting Committee that application should be made for a Provisional Order empowering the Council to supply electric light within the district.

The question of providing additional gas storage has been under the consideration of the Port Glasgow Town Council. The Gas Committee recommended a proposal for telescoping the present holder, and this has been agreed to, the estimated cost being about £1000.

A letter was read at the Hackney Vestry on Wednesday, the 9th inst., from the Gas Light and Coke Company, intimating that the price of gas will be raised from 2s. 10d. to 3s. per 1000 cubic feet, except that consumed by the street lamps, which will continue at the present rate until further notice. Several members protested against the increase as most unjustifiable and unreasonable.

A meeting of the Greenock Police Board was held recently to consider the report of the Sub-Committee on Electric Lighting. The Committee reported "that Mr. Teague, the expert who had been asked to report on the scheme, was of opinion it would not be necessary for the Board to light up the whole burgh in the meantime, and he recommends that operations be commenced on a moderate scale. He suggests the central site at Hunter-place, part of which is presently used as the depôt for the materials of the Master of the Works Department, and estimates the cost of an installation on that site at about £25,000, exclusive of the cost of the site. The installation proposed to be laid there would be capable of lighting up an area along the main thoroughfare, and including side streets, from Campbell-street on the west to the east side of Victoria Harbour on the east.

At a recent meeting of the Grimsby Town Council, a Committee of twelve members was appointed to consider and report as to the advisability of the purchase by the Corporation of the properties of the Grimsby Waterworks and Gas Companies, and upon what terms and conditions the said properties could be acquired.

All the electric lights at Yarmouth were on Saturday night suddenly extinguished through an explosion in the generating station, where two engines were wrecked through the condensers having been blown out, The street lighting was afterwards restored, but the service to private users, mostly for shops, failed utterly. Some days will be occupied in repairs before the private service can be again available. Traders transacted Saturday night's business with candles and lamps.

A Local Government Board inquiry has been held at Morecambe in reference to two applications made by the District Council for sanction to borrow £1400 for works of water supply, and £10,000 for electric lighting purposes. For the latter purpose a sum of £26,000 had already been borrowed. It was stated that the extra money was required on account of the increasing of the number of arc lamps on the promenade from 75 to 100, and the great demand for electric light at the west end of the town.

Electric lighting is making big strides in North London, and before long nearly all the main roads will be electrically lighted. The number of private consumers is increasing every week, and not a single vestry that has installed the light has failed to extend the system. In Shoreditch it is expected that there will be a profit of £2000 on the year's working, although the loss on the first quarter was £500. Islington shows a profit on revenue account of £4432 for 1897, and in St. Pancras the figures will show an increase of 25 per cent. Although in Hampstead the first fifteen months' working showed a loss of £2916, a profit of over £3000 is estimated for last year. As the profits from gas have heretofore gone into the pockets of private companies, ratepayers will appreciate the success of electric lighting, as the larger the profit the greater will be the relief to the rates.

Obituary.

SIR RICHARD QUAIN, M.D.

One of the most distinguished and popular men of the time has passed away by the death, on Sunday morning, of Sir Richard Quain, M.D.

He had been in ill-health for a long time, and was obliged to undergo two operations. All hope of his recovery had to be abandoned a fortnight ago, and since then his stock of strength gradually ebbed away, until on Saturday night he sank into a comatose state, and died peacefully at six o'clock on Sunday morning, in his eighty-second year. Through the skill of several medical friends (two of whom, Dr. Harold and Mr. Herring, were in constant attendance) he experienced no pain whatever.

Apart from his medical skill, Sir Richard Quain had great humour and charming geniality. He was a close and intimate friend of some of the most brilliant men of the last thirty years and a *persona grata* with Lord Beaconsfield. When the Duke of Fife, as a bachelor, entertained the Prince of Wales at Mar Lodge, no party was complete without Sir Richard Quain, for his presence always ensured any party being a success. He was the kindest friend to journalists, singers, and actors, many of whom he attended with an affectionate solicitude which he could not have exceeded for princes. It was with him a matter of pride that in his long career he never knowingly accepted a fee from a journalist. He constantly used his talents for doing kind deeds, and few who turned to him for help were ever disappointed.

Sir Richard was one of the many distinguished medical men who have been furnished by Ireland. He was born beside the lovely Blackwater, in the county Cork, in 1816, and began life under a surgeon apothecary in Limerick.

Making his way to London, as a young man of twenty, he entered the medical faculty of University College in the year that Queen Victoria came to the throne. During the ensuing half-century his career was one of accumulating fame, and of many professional distinctions.

In 1860 the Queen in Council appointed Mr. Quain a member of the senate of the university in which he had studied, after he had been in early life first house-surgeon and subsequently house-physician to the University College Hospital. He was also made Physician Extraordinary to Her Majesty.

He was a member of the Royal Commission which, in 1865, investigated the rinderpest, his colleagues being Lord Salisbury, Lord Playfair, Lord Spencer, and the late Lord Sherbrooke.

Several learned societies made him a Fellow; Trinity College, Dublin, gave him an hon. M.D.; Edinburgh, an hon. LL.D. He was one of the founders of the Pathological Society, editor of the "Dictionary of Medicine," author of numerous medical works, and had much responsibility for the last two editions of the "British Pharmacopœia"

Correspondence.

We do not in any way hold ourselves responsible for opinions expressed by our correspondents

A ROYAL COMMISSION ON SEWAGE DISPOSAL.

(*To the Editor of* The Sanitary Record.)

Sir,—All who have taken an intelligent interest in the modern attempts at sewage disposal will hail with thankfulness a Royal Commission on the subject. Especially is this the case with those who, like myself, have proved the latent power which undiluted sewage has "to make the desert smile, and the wilderness to rejoice and blossom as the rose." I for one have no fear of the result a Royal Commission will have on the bacterial treatment of sewage—a treatment that aims at solving the pro-

blem without the aid of land—for those who have initiated this method are being led by a way which they do not desire to know, and to see what they have refused to acknowledge before, namely, that it is futile to circumvent a beneficent law of nature by unnatural means.

The bacterial treatment of the waste products of life only need to be stripped of the glamour which is being thrown around it "as a profound new discovery," when it stands out as a perfectly natural method which has been in operation since the dawn of creation. For have not the researches of the agricultural chemist and biologist demonstrated that the fertile soil teems with bacterial life, and, in fact, is living earth, and not dead matter? Also, that it is this living earth which extracts from sewage the noxious matters which it contains, and changes them into luxuriant plant life. Yes, and what seems stranger still, this living earth has the power of destroying disease organisms which are ever present in sewage, and what causes foulness, disease, and death, will, when properly applied to the soil, produce health, life, and a growth so enormous as hardly to be realised.

It is most remarkable that the results of modern science, arrived at most unwillingly and in opposition to the cherished hopes of those who are trying to solve the sewage problem, should at last lead us to see a glimpse of the unsearchable wisdom of the Great Creator in all this, and that we, who cannot create a single atom, can by conforming to the conditions of nature, transform that which is already created, and that which has served its original purpose, into new and living forms of usefulness. This can be accomplished by carrying out the natural law that all that has come from the earth should be returned to it, and that all things that have had life will nourish future life when given fair play, by being placed within reach of the bacteria of the soil under proper conditions.—Yours faithfully,

WILLIAM BOWLER.

Longsight, March 9th.

Notes and Queries.

Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C.]

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

994.—INSPECTORS OF FACTORIES: MODE OF APPOINTMENT.—"F. H." writes:—"I am much obliged for your reply to my query. I have obtained, as suggested by you, particulars as to the examinations and appointments, from which I infer that the appointments are competitive. So I am undecided what to do, and shall be obliged if you will favour me with additional information on the subject. I enclose papers received from the Home-office."

Answer.—As we pointed out in our former reply, the appointment of Inspectors is vested in the Home Secretary, and this is borne out by the circulars obtained by our correspondent from the Home-office and submitted to us. Appointments are of two classes:—(1) Male Inspectors of Factories, and (2) Assistants to Inspectors of Factories. The limits of age for the former class are 21 and 30, with an extension up to 38 (*a*) in the case of a person who has been occupied as master, manager, foreman, or workman in a factory or workshop, for at least seven years, and has acquired practical acquaintance with the working of factories and workshop, and (*b*) in the case of a person who may have served as a Factory Inspectors' Assistant with the certificate of the Civil Service Commissioners from a time when he was under 30. The limits of age for Assistants to Inspectors are 21 and 40. The Civil Service Commissioners state that they are authorised by the Secretary of State to make the following announcement:—"Applications for the post of Inspector of Factories or of Assistants to Inspectors of Factories addressed to the Home Secretary will be considered from time to time as occasion may arise or fresh nominations be made. In the event of more than one candidate being nominated for a single vacancy and the examination thus being made competitive, the candidates will be so informed at the time they are nominated." The salary of an Assistant to Inspectors of Factories commences at £100 a year, and rises by annual increments of £5 to £150. The salary of an Inspector of Factories is not stated, but will be found in Whitaker's Almanac for 1898, page 157, and ranges from £200 to £500. The examination fee for Assistants is 10s., and for Inspectors £3. The subjects of examination are as follows:—For Assistants (1) Spelling and handwriting as tested by dictation; (2) arithmetic, first four rules, simple and compound; (3) an elementary knowledge of the principal provisions of the law relating to workshops.

For Inspectors of Factories the subjects are:—(1) Handwriting; (2) spelling; (3) arithmetic, including vulgar and decimal fractions; (4) English composition; (5) theoretical and practical acquaintance with factories and workshops, including a knowledge of their sanitary requirements; (6) applied mechanics, including elementary mechanical drawing; (7) (*a*) the Factory and Workshop Acts administered by H.M. Inspectors of Factories; (*b*) an acquaintance with the history of factory legislation in the United Kingdom.

No person can be appointed Inspector of Factories until the Civil Service Commissioners have issued in his favour a certificate of qualification for the post. Such certificate cannot be issued until the candidate has passed to the satisfaction of the Commissioners in all the subjects specified above. When two or more candidates are nominated to compete for one vacancy the competition will be in the subjects 5, 6, and 7.

If our correspondent desires to obtain a post as Inspector or Assistant he should make written application to the Home Secretary. We must observe that examinations for these appointments do not take place at fixed intervals, but are held from time to time as candidates are nominated by the Home Secretary to fill the vacancies which occur. The application should be written on foolscap paper, and made to the Secretary of State for Home Affairs, Whitehall, S.W. It is often found to be advantageous if a candidate can obtain the aid of a member of Parliament to recommend him to the notice of the Home Secretary.

995.—SWINE: IMPROPERLY KEEPING.—"J. C." writes:—"In my district the inhabitants generally take a delight in keeping animals and domestic fowls. As a rule the structures in which they are kept are built of pieces of timber of all shapes, sizes, and thicknesses, and when constructed they present an unsightly appearance, besides causing a great amount of trouble to the sanitary officials in constantly superintending them. Eighteen months ago I successfully prosecuted four persons for improperly keeping swine, there being defective pavement, absence of drains, and the premises generally being filthy. After the conviction the structures were moved some 40 yards further afield. The same conditions as to drainage and pavement still exist, but the premises are not yet so foul as formerly. I should like to know if the

Sanitary Authority have no supervision over these temporary structures such as would enforce the submission of plans for approval, showing the proposed means of drainage and other necessary provisions before such places can be used for keeping swine? There appears to be two ways of dealing with this class of nuisance, viz.:—Under Secs. 47 and 91 of the Public Health Act, 1875. Is it not more judicious to proceed under the former section?"

Answer.—Such buildings as those referred to are usually exempted from the operation of building bye-laws when they are distant "at least 8ft. from the nearest street and at least 30ft. from the nearest building and from the boundary of any adjoining lands or premises." In urban districts control over the keeping of swine is best exercised by the adoption of bye-laws for the prevention of keeping of animals on any premises so as to be injurious to health. Such bye-laws usually prescribe that swine shall not be kept nor swine's dung deposited within 100ft. of any dwelling-house, and also for the drainage of premises wherein such animals are kept. The effect of the adoption of such bye-laws is that it is not necessary to prove the existence of a nuisance, which is sometimes difficult to establish to the satisfaction of a Court of Summary Jurisdiction. All that is required is to prove that there is a contravention of the bye-laws, and it is not necessary that it should be a nuisance to any person. In the absence of such bye-laws, proceedings should be taken in urban districts under Sec. 47 of the Public Health Act, 1875, against the owner of the swine for keeping them "so as to be a nuisance to any person." It may be observed that the section applies not merely to the keeping of swine in improper places, but to keeping in an improper manner. It is not necessary to prove that the nuisance is also injurious to health.

996.—Footway Gutters: Powers of Urban Authority.—"Furnessia" writes:—"It is the practice here to drain the rain water from down-spouts across the footpaths by means of cross channels, which discharge into the channel at the side of the road. At the present time we make the owners put in iron cross channels, but some years ago stone ones were allowed to be used; the consequence is that some of these are now getting into a bad state of repair and very much worn, which causes water to stand in them in wet weather. I shall be glad if you will let me know through your valuable paper—which I read with interest—who is responsible for replacing the stone channels in cases where the streets have been taken over as public highways. Is it the owner's place to do this as part of the drainage of his property, or should the Council do it, as the footway is part of the highway, and the stone cross channels have been worn away by the traffic over same? As I am about to repair some of the old footpaths, I shall be obliged for advice."

Answer.—The district of our correspondent is that of an Urban Sanitary Authority. Under the provisions of Sec. 74 of the Towns Improvement Clauses Act, 1847, which section is incorporated with the Public Health Act, 1875, by Sec. 160 of the later Act, "the occupier (or owner, as extended by Sec. 160 of the 1875 Act) of every house or building in, adjoining, or near to any street shall, within seven days after service of notice from the Commissioners, put up and keep in good condition a shoot or trough of the whole length of such house or building, and shall connect the same either with a similar shoot on the adjoining house or with a pipe or trunk to be fixed to the front or side of such building from the roof to the ground, to carry the water from the roof thereof in such manner that the water from such house, or any portico or projection therefrom, shall not fall upon the persons passing along the street or flow over the footpath; and in default of compliance with any such order within the period aforesaid such occupier (or owner) shall be liable to a penalty not exceeding 40s. for every day that he shall so make default." We are of opinion that the Urban Authority in the case named by our correspondent may, under the provisions of this section, require the owners to repair or renew the footway gutters or substitute iron gutters for stone ones if such be deemed necessary by the Urban Council.

997.—County Medical Officer of Health: Powers of.—"Sanitas" writes:—"The district of this Authority is an urban one. Recently the County Medical Officer of Health paid an official visit to the town, and subsequently furnished the Corporation with a report on the unsanitary condition of the town; and when this report was discussed at the Council meeting some of the members ridiculed it and persisted in saying that the County Medical Officer had no right to visit the town in his official capacity or send any report thereon. Would you kindly advise whether this contention is correct?"

Answer.—We are not informed whether the district of the Authority referred to is that of a county borough, but assume that such is not the case. The duties and powers of a County Medical Officer of Health are not defined by statute, but are usually prescribed by regulations by the County Council appointing him. He is by such regulations generally required to keep himself informed, and to report to the County Authority, of the sanitary state of the constituent sanitary districts within the county, and as to whether there has been any neglect to properly put in force the Public Health Act, 1875, in any district in the county. Although he has no statutory powers of inspection or interference without the concurrence of the District Authorities, it is, we are of opinion, contemplated by Sec. 19 of the Local Government Act, 1888, that the County Council are enabled to institute such inspection, for Sub-section 2 of Sec. 19 enacts that: "If it appears to the County Council from such report (of a District Medical Officer of Health) that the Public Health Act, 1875, has not been properly put in force within the district to which the report relates, or that any other matter affecting the public health of the district requires to be remedied, the Council may cause a representation to be made to the Local Government Board on the matter." We infer that in the case named the County Medical Officer of Health has been entrusted, in consequence of the neglect of the District Authority, to ascertain whether there has been default in putting into force the provisions of the Public Health Act, 1875, prior to the County Authority causing a representation to be made to the Local Government Board on the matter, and that the information obtained has been furnished to the District Council for their observations thereon. If the District Council failed to give such required observations the County Council will doubtless make a representation to the Local Government Board, under Sec. 299 of the Public Health Act, 1875.

998.—Common Lodging-house: What is a?—"J. C." writes:—"In my district, in the course of a house-to-house inspection, I have met with a number of dwellings in which lodgers of the poorer classes are kept, and as they do not appear to me to come within the definition of common lodging-houses I shall be pleased to have an expression of your valued opinion thereon. In one dwelling-house there are eleven adult inmates, viz., the occupier, his wife, daughter, and eight male lodgers. They occupy six spacious bedrooms with no apparent overcrowding, but enjoy in common the kitchen as a day-room, its content being about 1179 cubic feet. The lodgers, who are strangers to each other pay, 3s. 6d. per week for lodging only, and find their own provisions. They work at a neighbouring ironworks, the last lodger being admitted over six months ago. The house is clean and appears to be well kept. As we have many houses of a similar description in the district, may I ask if you would consider the one in question a common lodging-house requiring registration? Having regard to Section 91, Sub-sec. 5, of the Public Health Act, 1875, are you of

opinion that part of this house is overcrowded, so as to constitute a nuisance?"

Answer.—We are of opinion that the house in question could not be held to be a common lodging-house. We may observe that there is no statutory definition of a common lodging-house, but the Law Officers of the Crown, when consulted as to the meaning of the expression "common lodging-house," advised that it appeared to them to have reference to that class of lodging-houses in which persons of the poorer class are received for short periods, and though strangers to one another are allowed to inhabit one common room. They were also of opinion that it did not include hotels, inns, public houses, or lodgings let to the upper and middle classes. Some assistance is also given as to arriving as to what is a "common lodging-house" by the definition of the term "public lodging-house" in the Towns Improvement Clauses Act, 1847, Sec. 116, which is as follows:—"Every house shall be deemed a public lodging-house within the meaning of this Act in which persons are harboured or lodged for hire for a night or for less than one week at one time, or any part of which is let for any term less than a week."

We do not think under the circumstances named, that a conviction could be obtained against the occupier for a contravention of the provisions of Sec. 91, Sub-sec. 5, of the Act of 1875, for overcrowding.

999.—Refuse Removal: Duty of Local Authority.—"J. W." writes:—"In the centre of my district, which is a rural one, is the market town, having a population of about 900, which has a sewerage system and a proper water supply. There is great difficulty in dealing with vegetable refuse and contents of privies, middens, and receptacles, for want of a suitable tip. Is it the duty of the Council to provide a site for the disposal of these matters? Is it also their duty to provide a site for the disposal of vegetable and fish refuse from those dealing in vegetables and fish?"

Answer.—The Rural District Council, as the Sanitary Authority, should, we are of opinion, provide a means of disposal for the matters removed from privies and ashpits. If this is not done it is highly probable that the Local Government Board will, if a complaint be made to them under Sec. 299 of the Act, by order require them to undertake or contract for the removal of house refuse from premises, and the cleansing of earth-closets, privies, and ashpits, for the town, under Sec. 42 of the Act of 1875. Vegetable and other refuse from shops is trade refuse, which the Local Authority cannot be required to remove or provide means for its disposal.

1000.—Water-closets without Proper Means of Flushing: Procedure to Enforce.—"J. W." writes:—"Many houses in an urban district have one or more sufficient water-closets internally, but have an external water-closet in addition without any proper means of flushing. Does Sec. 36 of the Public Health Act, 1875, apply to these outside water-closets under such circumstances, or is it necessary for the Urban Council to frame bye-laws as to keeping water-closets flushed with water, under the Public Health Acts (Amendment) Act, 1890? Or what other course is it necessary to take?"

Answer.—Inasmuch as the houses are already provided with one sufficient water-closet, we are of opinion that the provisions of Sec. 36 of the Act of 1875, will not apply in the cases named by our correspondent. If the water-closets are, owing to the absence of proper means of flushing, a nuisance or injurious to health, the Local Authority may institute proceedings against the owners under Secs. 41 or 94 of the Act of 1875. Where, however, the Public Health Acts (Amendment) Act, 1890, has been adopted, it will generally be found more advantageous to frame bye-laws under Sec. 23 of that Act, as to the keeping water-closets supplied with sufficient water for flushing, and proceed against the owner under the provisions of these bye-laws. It may be observed that such bye-laws apply both to old and new buildings. Model Bye-laws under the section named may be obtained from the Local Government Board, or from Messrs. Knight and Co., 90, Fleet-street, E.C.

Contracts Open.

The dates given below are the latest up to which tenders can be received.

Great Wakering (Essex). — March 21st. — Scavenging.—Mr. Frederic Gregson, Southend-on-Sea.

Hull. — March 21st. — Scavenging. — Mr. J. P. Chatham, clerk, Lincoln's-inn-buildings, Hull.

London, N. — March 21st. — Sewers. — Mr. E. J. Lovegrove, C.E., engineer to the Council, Southwood-lane, Highgate, N.

Spennymoor.—March 21st.—Scavenging, &c.—Mr. G. W. Rogers, surveyor, Spennymoor.

Wakefield.—March 21st.—Sewerage Works.—Mr. R. Porter, city engineer, Town Hall, Wakefield.

Alford (Lincs).—March 22nd.—Scavenging.—Mr. J. E. H. Sergeant, clerk to the Urban District Council.

Blaby (Leicester).—March 22nd.—Scavenging, &c.—Mr. B. A. Shires, clerk, Alliance-chambers, Municipal-square, Leicester.

Branksome (Dorset).— March 22nd — Sewerage Works — Mr. Samuel J. Newman, F.R.I.B.A., 3, Tennyson-buildings, Ashley-road.

Solihull (near Birmingham) —March 22nd.—Sewers, &c.—Mr. A. E. Currall, The Square, Solihull.

Malling (Kent).—March 23rd.—Drainage.—Mr. John Ladds, architect, 7, Doughty-street, Mecklenburgh-square, W.C.

Wombwell (Yorks).—March 26th.—Scavenging.—Mr. Jno. Robinson, clerk to the Urban District Council.

Shettlestone (Scotland).—March 28th.—Sewer Pipes, &c.—Messrs. Warren and Stuart, civil engineers, 115, Wellington-street, Glasgow.

London, W.—March 29th.—Sanitary Alterations.—Mr. T. Hensman Munsey, vestry clerk, Vestry Hall, Piccadilly, W.

Runcorn.—March 29th.—Sewering.—The Surveyor's Office, Town Hall.

Epping (Essex). — April 5th. — Sewers, &c. — Mr. Edmond Egan, A.R.I.B.A., engineer to the Council, Holmdale, Loughton, Essex.

Vacancies.

Assistant Engineer (London, E.C., March 21st).—For the Bengal-Nagpur Railway Company, Ltd. Salary, first year, Rs.450 per mensem; second year, Rs.500 per mensem; third year, Rs.550 per mensem. Mr. Robert Miller, managing director, 132, Gresham House, Old Broad-street, London, E.C.

Assistant Inspector of Nuisances (London, N., March 23rd).—For the Hornsey Urban District Council. Salary, £120 per annum, rising by annual increments of £5 each to a maximum of £150. Mr. F. D. Askey, clerk, 99, Southwood-lane, Highgate, N.

Clerk of Works (Wolverhampton, March 28th).—Wages, £3 per week. Mr. J. W. Bradley, C.E., borough engineer and surveyor, Town Hall, Wolverhampton.

Clerk of Works (Neath, March 28th).—For the Neath School Board. Salary £2 2s. per week. Mr. J. Cook Rees, architect, Neath.

Engineer and Manager (Hinckley, March 21st).—For the Urban District Council. Salary not to exceed £250 per annum, with house, coal, and gas. Mr. J. W. Preston, clerk, Hinckley.

ENGINEERING ASSISTANT (WEST HARTLEPOOL, March 29th). Salary, £2 per week. Chairman of the Works Committee, Borough Engineer's Office.

ENGINEER (LEEDS, March 23rd).—For the Trustees of the Aire and Calder Navigation. Salary, £500 per annum. Mr. S. Barraclough, secretary, Aire and Calder Navigation, Dock-street, Leeds.

GAS ENGINEER AND MANAGER (COLNE, March 21st).—For the Corporation. Salary, £225 per annum. Mr. Alfred Varley, town clerk, Town Hall, Colne.

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INSPECTOR OF WEIGHTS AND MEASURES (WINCHESTER, March 22nd).—For the Town Council. Mr. Walter Bailey, town clerk, Guildhall, Winchester.

SURVEYOR, &c. (PLYMPTON, DEVON, March 19th).—For the Plympton St. Mary Rural District Council. The salary will be £150 per annum, and a commission of 2½ per cent. upon all works carried out at a sum exceeding £250. Mr. Fred. W. Cleverton, clerk, 4, Buckland-terrace, Plymouth.

SURVEYOR (DOUGLAS, ISLE OF MAN, March 23rd).—For the Town Council.—Salary, £200 per annum. Mr. Thomas S. Nesbitt, town clerk, Town Hall, Douglas.

COMPETITIONS.

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THE

Sanitary Record,

MARCH 25, 1898.

Notes.

The Plague in India.

THERE was a slight subsidence in the mortality from the plague in Bombay last week, and for that little we have to be thankful. The official returns were 1059 deaths due to plague, and 2137 deaths from all causes, the general death-rate being 133·7 per 1000; but as the returns cannot be complete owing to the opposition of the natives, the true figures are probably very much higher. There is a further telegram, stating that

the city is now quiet; that about 200 arrests were made in connection with the riots, and that the dock labourers on strike have not yet returned to work. That is the gist of this week's news. It is brief; but how it tells of the state of tension in which the rulers of the city must be living. Imagine for a moment such a death-rate in London; what a panic there would be! And yet in Bombay the Sanitary Authorities have not only to witness this terrible mortality, not merely to carry on a deadly struggle with this awful epidemic; but at the same time to combat deep-seated religious and racial antipathies, which make the problem they have to face one of enormous complexity.

The Gravity of the Situation.

In connection with this subject, we would call our readers' attention to a very powerful article in the *Spectator* of the 12th inst., in which the writer draws a very vivid picture of the disastrous state of affairs in the great Indian city, and graphically describes the spirit of discontent and disaffection with which the vast population is at present seething, in consequence of the conflict between the religious traditions and beliefs of the East and our Western notions of the paramount importance of sanitation. It is difficult for us to appreciate to the full the gravity of the situation on account of our imperfect understanding of Oriental ideas; but it is undoubtedly very serious. So bitter, indeed, is the feeling against the measures of the Plague Committee—measures which in the eyes of Hindoos and Mohammedans alike are, in their interference with women and the examination of the dead, nothing short of desecration—that it is not at all impossible that a much more terrible explosion than the one which caused such alarm a fortnight ago might occur any day; and who can tell where it might stop? When the religious fanaticism of the East is once set ablaze, the fear of death is as naught, and it must not be forgotten that we are but a handful of Englishmen in the midst of a city of 900,000 inhabitants.

What is to be Done?

The *Spectator* discusses various alternative methods of dealing with the epidemic, other than that which is at present being carried out with such doubtful success. One is so drastic and even desperate in character that it is easy to understand that the Authorities should shrink from its adoption, to order the removal of the entire population for a time to the mainland, and to cleanse the infected city by fire. And yet the writer believes that the natives would obey such an order with almost stoical content. Another suggestion—and it is singular to think that it also would be acceptable, and perhaps popular—is to suspend all sanitary measures, and allow the plague to run its course until it has killed out all who are liable to its ravages. But that is an idea that would be utterly abhorrent to our notions, however it might chime in with those of the native mind, for it is our plain duty not merely to save the city despite of itself, but to see that the limits of the epidemic are not allowed to extend. If we were to fail in this duty we should incur a grave responsibility to the rest of mankind.

The "Spectator's" Last Course.

A third alternative suggested by the *Spectator* is, if practicable, "to consult the best moolahs and pundits as to the rules which really affect religious faith or the Indian ideas of honour, to withdraw these, and to devote all strength and attention to the thorough cleansing of the city, re-making all drains, opening all quarters impervious to the wind from the sea, burning the floor of the streets, exterminating all rats, closing all chawls—the vast tenement houses with five hundred inhabitants, which are packed like sardine boxes—and burning down remorselessly every house in which an inhabitant has died of the plague." The great objection to the present examination and segregation measures is that they are opposed to all the religious instincts of the people; the Mohammedans, indeed, declare that they are contrary to the precepts of Islam, and nothing can be more dangerous than to persist in a course that has this tendency. Even the native gentlemen of position and influence now refuse any longer to co-operate with the Plague Committee, and that means that the work has to be left entirely to Europeans, who are already in bad odour. The populace prefer to die of disease rather than have their religious ideas violated. There is a touch of irony in the *Spectator's* concluding remark on the lamentable necessity of "killing her Majesty's subjects with bullets in order to persuade them not to suffer themselves to be killed by buboes."

The Small-pox at Middlesbrough.

A recrudescence of the epidemic of small-pox in Middlesbrough has for some time been looked for, and unfortunately these anticipations have been realised, though the revival has not been quite so bad as was feared. Still, after the extremely low number to which the notifications were reduced, it is mortifying to see the number again on the increase. The figures for last week were three new cases on the 13th inst. (the lowest yet recorded), nine on the 14th, sixteen on the 15th, twenty-one on the 16th, sixteen on the 17th, and twenty on the 18th; the total number of cases up till the last-mentioned date being 1012, of which 124 have been fatal, so that during the course of the week we are able to trace a steady increase in the number of cases; and it is further to be noted that nearly all the new cases are from fresh centres. The Authorities believe, however, that the worst is now over. Though the epidemic continues obstinately to linger, the machinery for coping with it is in good working order, the hospital accommodation is ample, and the means of isolating patients excellent. A large number of patients have recently been discharged from hospital as cured, and of those still remaining—about 400—most are convalescent, the number of dangerous cases being very small.

The Vaccination Bill.

The introduction by Mr. Chaplin of the Vaccination Bill last week brings us at length within sight of what we may hope will prove a settlement of most of our troubles connected with small-pox and vaccination. As long as there are hardships in the administration of the law of which anti-vaccinators may

reasonably complain there will continue to be resistance, and lamentable outbreaks, such as that which is still rife at Middlesbrough and the still more dreadful one at Gloucester a short time back, may be expected to recur. The fact that most of their objections to vaccination are founded on fallacies and delusions does not shake the faith of anti-vaccinators in their cause. Their position has been argued with vigour and ability in a pamphlet recently published by so illustrious a scientist as Dr. Russel Wallace, of Darwinian fame. But, however eminent Dr. Wallace may be as a biologist, we are not aware that on this subject he is entitled to speak with any peculiar authority; and therefore, when his distinguished name is triumphantly appealed to by anti-vaccinators, they forget that he cannot claim in this field the weight attaching to a specialist, all the authority of medical opinion being, indeed, on the other side.

The Groundwork of the New Proposals.

Turning now to the proposals that have been placed before Parliament, we find that in the main, as was expected, they follow on the lines of the recommendations of the Royal Commission; and as they undoubtedly remove the principal grievances alleged by the anti-vaccinators, we may hope to see vaccination become practically universal. The proposals are based upon the important scientific discovery which Mr. Chaplin spoke of as one that would probably revolutionise the whole system of vaccination in this country—the preservation of lymph in glycerine. It has been established that this mode of treatment has the effect of destroying all extraneous organisms and noxious germs, without impairing the active qualities of the lymph; and further, the glycerinated lymph can be made in large quantities, and may be preserved for a considerable time. Now, this at once removes the prime difficulty with regard to arm-to-arm vaccination, for the Local Government Board, in compliance with the recommendation of the Commission that calf lymph should be placed within the reach of all, have acquired the necessary accommodation for preparing the lymph, and are making arrangements to supply it as required.

The Provisions of the Bill.

The great objection to compulsory vaccination being, therefore, done away with, vaccination is to continue to be compulsory, but only with calf lymph. Arm-to-arm vaccination will practically cease to be. That, in itself, is a great improvement in the law, and should go far to meeting the scruples of anti-vaccinators, as they will no longer be able to plead that vaccination is the means of transmitting disease. Then the next provision, whereby the public vaccinator will have to attend the child in its own home, as is already done in Scotland, instead of compelling it to be brought to the vaccinating institution, will also be welcomed as a most salutary reform. The third important change in the law is that the period within which a child must be vaccinated is to be extended from three months to twelve months, there being a greater immunity from the risks of vaccination at the more advanced age. Finally, cumulative penalties for non-compliance are to be abolished. The recommendation of the Commission that those who have conscientious objections to vaccination, and make a statutory declaration to that effect, should be exempted, is rightly thought by the Government to be merely opening the door to evasion of the law, and so the penalties are to be retained.

Other Sanitary Measures in Parliament.

Altogether, the week in Parliament has seen quite a creditable share of sanitary legislation. The most important measure has, of course, been the Vaccination Bill, whose prospects of becoming law this session are, we should think, pretty safe, judging from the extremely favourable reception it received from all parts of the House. We have besides to chronicle the introduction once more of the perennial Plumbers' Registration Bill. Let us hope that a better fate is in store for it this year than it has met with in previous sessions. The Rivers Pollution Prevention Bill has also been brought forward for second reading and adjourned; the main object of the Bill being to bring the general law into harmony with what it is in Yorkshire and Lancashire, by enabling Municipal and County Authorities to appoint joint committees to deal with the pollution of rivers in their respective districts. The measure is opposed on the ground that it will prevent Corporations and other Authorities from carrying out important drainage undertakings, but we understand that its underlying principle is viewed with favour by the Government.

Life of Pasteur.

To those who would wish to obtain in a concise and popular form a comprehensive view of the services rendered to science by Pasteur, and of his work in connection with micro-organisms and their effect on man and the lower animals, we would recommend a perusal of the biography published by Messrs. Cassell and Co., in the "Century Science Series." The authors of the book are Dr. and Mrs. Percy Frankland, and they have achieved a considerable measure of success in their undertaking. The results of Pasteur's researches have entered so largely into the modern biological study of disease that it would be well that all who take an interest in the progress of sanitary science should acquaint themselves with the nature of his work, and for this purpose no better means can be afforded than such a popular and well-written handbook as the present publication.

New Methods of Fighting Infection.

Dr. Waldo has performed a public service in the report he has just presented to his Vestry, with regard to the importance of making scientific investigations in doubtful cases of typhoid and diphtheria. In it he emphasises the importance of a threefold bacteriological examination, viz., at the first signs of throat trouble; then, should it prove to be diphtheria, during and after the attack. These investigations, of course, are most valuable in ill-defined attacks. "No one," says Dr. Waldo, "who is skilled in practical medicine could fail to recognise at a glance a well-marked case of either

diphtheria or of typhoid fever. The most experienced medical man in the world, however, will be undecided for a time in a certain proportion of attacks of both these maladies. The bacteriological method would therefore be of value in settling differences of opinion between medical men, and in the case of typhoid would at once determine the proper and only safe line of treatment." The methods of testing are described by Dr. Waldo, together with the means to be employed in the collection of specimens; and the probable cost is put down at from 2s. 6d. to 3s. 6d. per examination; that is, when the necessary outfit has been provided.

Dr. Waldo's Conclusions.

A BRIEF review is made of the practice prevailing in other metropolitan districts; also in the provinces and the United States. The report closes with a statement of the conclusions arrived at by Dr. Waldo, as a result of his investigations. Briefly these are:—(1) That it is of great value from a practical standpoint to detect diphtheria and typhoid fever with certainty, especially in the early and the late stages. In both cases the method may be now and then essential in the prevention of the spread of the disease. (2) That the benefit will be both individual and general—(1) Individual, in the determination of doubtful cases and of the proper course of treatment, and in saving him from unnecessary exposure. (2) General (*a*), in the detection of cases, and so of indicating the need of isolation and disinfection; (*b*) in preventing uncured cases in children from returning to school and there becoming fresh centres of infection. (3) That the possibility of such detection is now rendered scientifically certain by means of a bacteriological examination of the secretions of diphtheria and of the blood of patients suffering from typhoid fever. (4) That the actual cost of the Vestry would be small in comparison with the gain to patients and the prevention of the spread of disease. (5) That, so far as he has been able to learn, the experience of those Sanitary Authorities who have adopted the tests has been satisfactory, although perhaps medical men have not availed themselves of the proffered opportunities so generally as had been anticipated. (6) That in his opinion the adoption of both tests would be of distinct value to the sanitary administration of the district of St. George the Martyr. We understand the report has been referred to the Health Committee of the Vestry, not, we trust, to be "pigeon-holed."

The Policy of Supression.

WE make this last remark advisedly, for it would appear that the St. George's Vestry has resolved to make itself celebrated for the manner in which it treats its officers' reports. Last year our readers will remember an effort was made to suppress Dr. Waldo's annual report, and it seems likely that the same course will be again attempted. The method adopted, however, is more ingenious. We understand that 500 copies of this report have been printed, but for the present only sixty copies are available, that is one copy for each member of the Vestry; the remainder are to be carefully packed up until the annual report of the Vestry shall have been prepared and printed, when it will be bound up with the latter. But months must elapse—that is, if we take former years as a precedent—before this is accomplished. It is not surprising that many think the report contains a further record of "dark places" in Southwark; and that the real reason for the policy of suppression is a lack of willingness on the part of the Vestry to deal with the crying evils of the district. The members will waste whole evenings in discussing "points of order" and "abstract theories"; but no time can be found to perform the proper duties of a public body, viz., administer the law and support its officers in working to promote the health and well-being of the inhabitants. And this, we are told, is one of the "most advanced" Vestries in London.

Sewage Purification.

THE correspondence on this subject at present being carried on in our columns increases in interest as it progresses. It is remarkable how the champions of particular processes are able to prove, "beyond the shadow of doubt," that their own especial method transcends all others in efficiency and economy. But we are gaining knowledge. The publication of results actually obtained will enable impartial observers to judge the advantages to be secured by the adoption of newer systems. And, further, that the nature of the soil and geographical position of each district will still help to make or mar any scheme. Of one thing we are assured, finality is not yet within sight, but the accumulation of facts, such as are forthcoming in our columns from time to time, will enable the present generation to make infinitely better provision for the disposal of its sewage than was possible even a decade ago.

Abatement of Smoke Nuisances.

IN proceedings by a Sanitary Authority to enforce the abatement of a nuisanse by smoke from factory chimneys, it is not necessary that the Authority should describe in the statutory notice to the person in default what works are necessary to be done in order to abate the alleged nuisance. Such was the decision in the Queen's Bench Divisional Court, on January 20th last, in Millard *v.* Wastall, 62 J.P. 135; and this decision will be of interest to many, inasmuch as it has been frequently supposed that in such proceedings the Local Authority should state in their notice what special works were necessary. The case referred to was an appeal from the Justices in and for the Borough of Ramsgate, who had dismissed the complaint on the ground that the notice of the Authority was insufficient, because it did not specify the works required to be done to abate the alleged nuisance. The appeal of the Local Authority was allowed, Mr. Justice North observing that it was not necessary for the Authority to invent works to be done by the persons by whom nuisances are required to be abated. In many cases such as the present no works were necessary; all that was required was that the respondent should refrain from using such coal as caused the emission of black smoke from his chimney. Justice Lawrance also observed that no works were necessary to be done in the case. It was much the same as if a nuisance was caused by keeping pigs; the owner must either keep the styes clean or remove the pigs.

NOTES ON
PRACTICAL SANITARY SCIENCE.

By WILLIAM H. MAXWELL.

Assistant Engineer and Surveyor, Leyton Urban District Council, Author of "Drainage Work and Sanitary Fittings," "Ventilation Heating, and Lighting," &c., Certificates of the Association of Municipal and County Engineers, and Sanitary Institute.

No. 54.—REFUSE DESTRUCTORS.

(*Continued from page 277.*)

"*Steam-raising value of the Refuse and Sewage Cake.*—Duration of trial, 10 a.m. to 10 p.m., March 30th, 1897 = 12 hours. Number of cells of destructor in use, 4.

Detailed Results of Trial.

	tons. cwt. qr.	lbs.
Weight of house refuse consumed	22 5 0 =	49 840
Weight of sewage cake consumed	11 4 1 =	25,116
Total weight of material burnt	33 9 1 =	74,956
Proportion of house refuse to sewage cake	100 : 50·4 =	2 : 1 (nearly)
Average weight of material burnt per cell per hour...	... ...	1,561
Total weight of clinker produced	9 16 2 =	22,008
Proportion of clinker produced to material burnt	... ...	29·4 per cent.
Average steam pressure in boilers	... ...	105
Average temperature of feed-water	... ...	65 deg. Fah.
Weight of water evaporated ...	3192 gals. =	31,920
Weight of water evaporated per hour	... ...	2,660
Weight of water evaporated per lb. of material burnt	... ...	0·426

Corresponding with :—

Weight of water evaporated per lb. of material burnt from and at 212 deg. Fah.	... ...	0·597
Average pressure of air in ashpit	... ...	2 in. of water.

"The extremely low quality of the material consumed (poor house refuse and wet sewage cake) is indicated by the small quantity of water evaporated per pound of fuel (0·426 lb.). In spite of this, the total power produced was considerable; taking the total weight of water evaporated as 31,920 lb., and assuming an average consumption of 20 lb. of water per indicated horse-power, the horse-power available would be 133 indicated horse-power; the equivalent amount of steam coal which would be required to obtain this result is 1¾ tons, representing a cost of £1 11s. 6d., assuming the price of coal to be 18s. per ton delivered at the works.

"The total heat available was more than sufficient to heat the boilers, and these in their turn supplied more steam than was required for the needs of the works, which was served by a 45-horse power engine in the sewage works, and by a 12-horse power engine in the portion occupied by the destructors. A smaller engine drove two fans delivering air to the ashpits of the cells, a dynamo lighting the works and a steam hoist for raising the sewage to the charging floor, and a feed-water pumping engine was also provided with steam from the boilers. The larger engine drove a pump lifting sewage from low to high level, an air compressor for the filter press, and all minor plant in the sewage works.

"*Completeness of Destruction of Refuse.*—During the trial attention was specially directed to the question as to how far the destructor accomplished its work in consuming the wet and objectionable refuse supplied to it in such a manner as to leave nothing but innocuous products. This portion of the inquiry appears to us to be of fundamental importance, in that complete combustion of noxious and putrescent refuse is of greater moment than is the production of power as an incident in its consumption.

"The ultimate materials constituting the output of the destructor are clinker and gaseous products of combustion; both should be as fully oxidised as possible. Accordingly, analyses of the clinker and gases were made with the following results:—

"(I.) *Clinker.*—The quantity of unburnt carbonaceous matter was determined, carbon 2·10 per cent. The amount of combustible material left in the clinker is therefore extremely small; moreover, it is present as well-charred particles, and is no more objectionable than that commonly present in furnace ashes.

(II.) *Gaseous Products of Combustion.*—Samples were taken both from the combustion chamber of one of the destructor cells and from the boiler flues at the point where they were connected with the underground flue leading to the chimney.

A.—*Gases from Combustion Chamber.*

	Percentage by Volume. 1.	2.
Carbonic anhydride (CO^2) ...	6·9	6·7
Carbon monoxide (CO)	Nil	Nil
Oxygen (O)	12·9	12·8
Nitrogen (N)	80·2	80·5
	100·0	100·0
Corresponding with free air ...	61·4	61·0

B.—*Gases from Boiler Flue.*

	Percentage by volume. 1.	2.	3.	4.	5.
Carbonic anhydride (CO^2)	2·7	4·2	5·0	3·6	4·9
Carbon monoxide (CO) ...	Nil	Nil	0·4	Nil	0·2
Oxygen (O)...	17·2	14·8	14·5	15·9	14·4
Nitrogen (N)	80·1	81·0	80·1	80·5	80·5
	100·0	100·0	100·0	100·0	100·0
Corresponding with free air	81·9	70·5	69·0	75·7	68·6

"From these figures it is evident that substantially complete combustion is effected, carbon monoxide (a product of incomplete combustion) being usually absent; and, when present, existing only in negligible quantity in the flue gases. That the combustion was thorough was further proved by frequent observation of the smell of the flue gases; they were found to be free from offensive odour, and to contain no evil-smelling product of destructive distillation or imperfect oxidation. This is of importance, because the consumption of wet refuse is likely to give rise to objectionable gaseous products, unless steps are taken (as in this case) to oxidise the products thoroughly before they pass into the chimney flue.

"On account of this fact it is desirable that there should be an ample supply of air, over and above the calculated quantity necessary for the complete oxidation of the carbonaceous matter. In the case of the samples examined this condition is fulfilled, inasmuch as they contain from 61 per cent. to 81·9 per cent. of free air. It is possible that it may be found practicable somewhat to diminish this large excess of air, without impairing the com-

pleteness of combustion, and with a gain in efficiency in heating the boilers. At present, however, the total heat available is so much greater than that which can be usefully employed, that this increase of efficiency is of no immediate importance.

"*Retention of Dust by Destructor.*—Not only is it necessary that the products of combustion from an efficient destructor should be fully oxidised, but it is also highly desirable that they should be as free as possible from dust and smoke.

"The behaviour of the destructor in this respect was ascertained by filtering a known volume of gas drawn from the combustion chamber, and determining the weight of dust thus separated. The quantity found was:—Dust per cubic foot of gas from combustion chamber, 0·18 grain.

"The amount is, therefore, inconsiderable, even at a point so close to the grate as to allow but little time for the deposition of any suspended matter which might be scattered by the blast of air supplied to the ashpit. Many larger particles of slag (as distinct from fine dust) passed over into the combustion chamber in a state of incandescence. These being in a semi-fused state, adhered to the walls of the chamber, and formed a protective coating on the brickwork against injury either by heat or attrition.

"A trial was also made of the gases passing from the boiler flue to the chimney. In this case the quantity of dust was found too small to estimate.

"Observation of the smoke from the chimney, made at frequent intervals during the trial, showed that the amount emitted was unusually small. It was light brown in colour, and was readily dissipated within a short distance of the mouth of the chimney.

"Considering these facts conjointly, it is evident that during the trial almost complete retention of dust was effected.

"*Temperature of Combustion Chamber.*—The temperature of the combustion chamber when the charge was burning freely was determined and found to be:—

850 deg. Cent. = 1562 deg. Fah.

"This corresponds with a moderate red heat, and is sufficient to complete the combustion of any unburnt products escaping from the grate.

"Naturally, if refuse only of fair average quality was consumed, the heat would be much greater—probably more than 2000 deg. Fah.

"*Temperature of the Flue Gases.*—Observation of the temperature of the gases in the underground flue leading to the chimney was made at intervals during the trial. It was found to fluctuate somewhat according to the stage of firing the cells; the temperatures taken are as follows:—

No. of Observation.	Temperature of the Flue Gases.			
1	230 deg. Cent.	=	446 deg. Fah.	
2	320 ,,	=	608	,,
3	250 ,,	=	482	,,
4	270 ,,	=	518	,,
5	238 ,,	=	460	,,
6	227 ,,	=	440	,,

"The comparatively high temperature of the flue gases is due to the fact that during the trial more heat was being produced by the destructor than could be absorbed by the boilers, the furnaces being indeed capable of generating a good deal more power had a third boiler been available. The two boilers in use were blowing off at 110 lb. pressure throughout the test.

"*Examination when Cold.*—We examined one of the cells in its cold condition, and were unable to discover any signs of wear or abrasion.

"*Conclusions.*—From a consideration of the results of this trial we have arrived at the following conclusions:—

"(1) The destructor is capable of consuming wet sewage-cake, and house refuse of poor character in a complete and satisfactory manner.

"(2) The oxidation of the combustible matter in the material fed into the destructor is complete, and the gaseous products of combustion are inoffensive.

"(3) The gaseous products of combustion are sensibly free from any suspended matter by the time they pass into the flue to the chimney.

"(4) The clinker is well burnt and free from offensive half-charred carbonaceous matter.

"(5) Even when working with a wet sewage-cake, and poor house refuse, the destructor generates more heat than can be used with the present plant at Leyton.

"We therefore consider that this destructor provides an efficient and economical method of destroying the refuse of towns without injury to the neighbourhood. So far as we are aware, it is the only form of furnace yet adopted capable of burning a considerable proportion of sewage sludge—even when containing, as in this case, a high percentage of moisture."

THE SANITATION OF DOMESTIC BUILDINGS.

By Frank Latham, C.E., M. San. Inst., &c., Assistant Surveyor, Borough of Margate.

CHAPTER VI.

Section 1. (*continued*).

Some of the principal joints made for joining water-closets to soil pipes are executed in the following manner:—Dent and Hellyer's closets

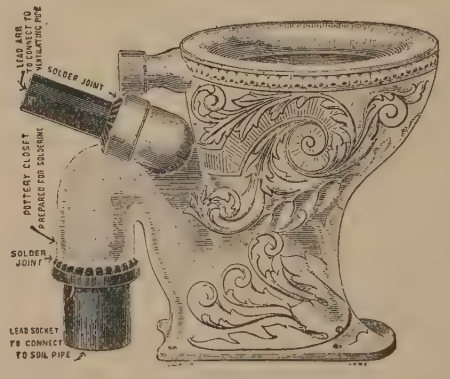

LEAD ARM TO BE BURNT TO EARTHING PIPE
SOLDER JOINT
POTTERY CLOSET PREPARED FOR SOLDERING
SOLDER JOINT
LEAD SOCKET TO CONNECT TO SOIL PIPE

Fig. 59.

are, as a rule, specially arranged to meet the difficulty of forming a proper joint. The outlet pipe of closet is of lead, flanged, and bolted to the water-closet trap below the water-line, so that if any leakage takes place it would immediately show itself (Fig. 59). This provision enables a proper

wiped joint being made between the lead outlet and soil pipe branch.

Doulton's patent Metallo Keramic joint (Figs. 59

Fig. 59 (Section).

and 60), is always adopted by the author with their closets, is a lead out-go pipe jointed to the earthenware—a joint which is perfectly se-

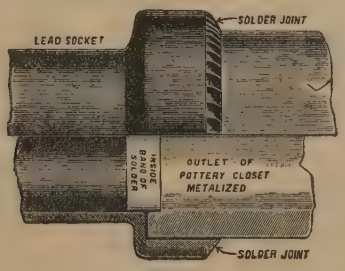
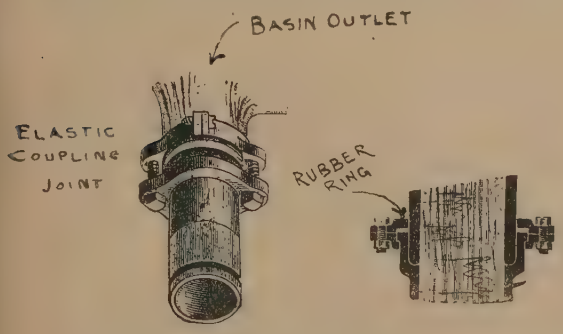


Fig. 60.

cure and reliable, forming a first-rate connection with the soil pipe branch, the plumber merely having to make a wiped joint between the two.



Figs. 61 and 62.

Jennings' elastic coupling and union joint, as illustrated (Figs. 61 and 62), ensures an air-tight connection between the soil pipe and closet

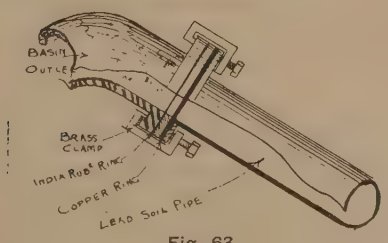


Fig. 63.

basin. Another connection on a similar principle to the latter is the clamp and rubber-ring joint Fig. 63). The brass socket and cement caulked joint (Fig. 64) is frequently used, and when properly executed renders a safe connection.

The action of frost on ordinary closets and

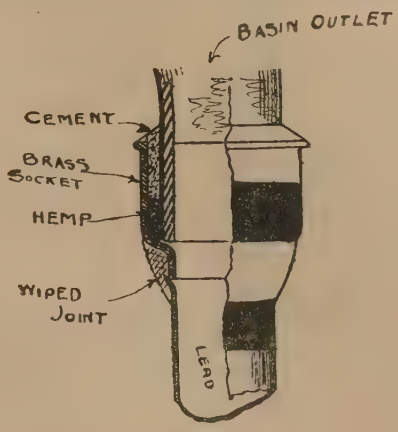


Fig. 64.

flushing apparatus when in exposed positions is sometimes very destructive and injurious to their effectual working. Special provision should therefore be made to prevent freezing, and to do this

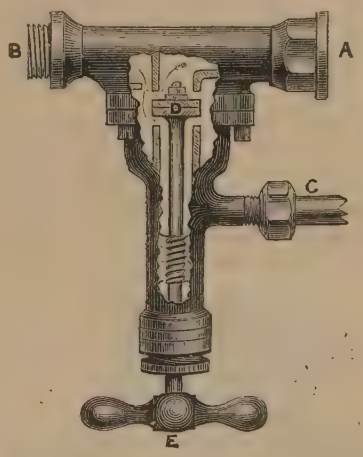


Fig. 65.

where the pedestal closet and arrangements are used, they should, together with all waste pipes, be fixed on the least exposed wall, and the water-supply pipe provided with a frost tap, such as Simpson's

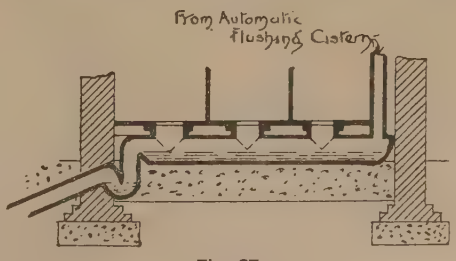


Fig. 67.

patent (Fig. 65), so that the water may be turned off and drawn from the pipes during severe frosty weather when not required for use. The closet-

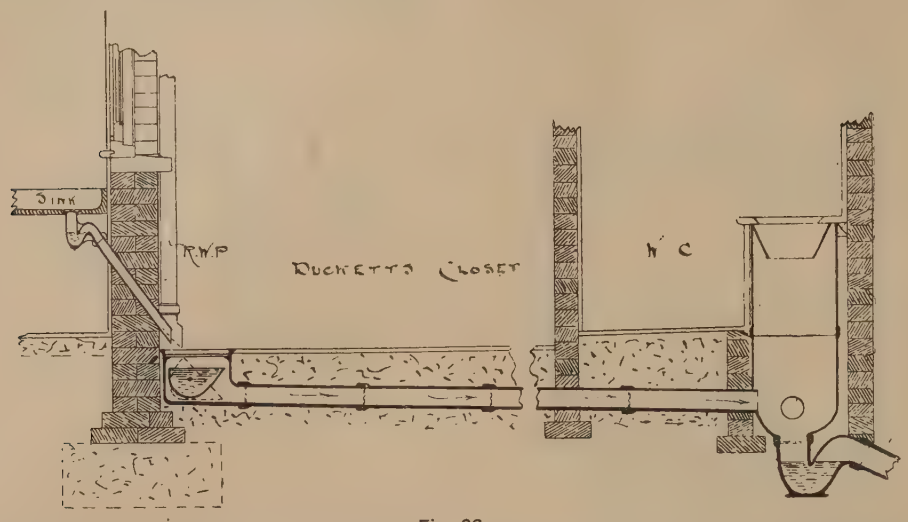
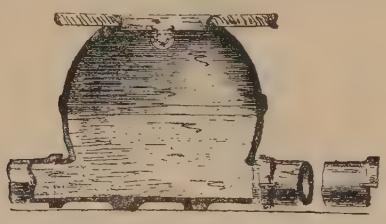


Fig. 66.

basin should also be provided with a cover which should be kept closed, and a small quantity of kitchen salt sprinkled with the water of basin will further prevent freezing.

Some excellent closet contrivances have been invented for cottages and other small properties. The slop-water closet, such as J. Duckett and Son's (Fig. 66), which is largely used, is so constructed that the soil is removed from the apparatus by the waste water from sinks, baths, and rain-water gullies, which is conveyed to a vessel or tank holding 3½ gallons. This upon becoming full tips up or syphons out and automatically flushes the apparatus and drains, the former again regaining its



JENNING'S SYPHONIC TROUGH CLOSET

Fig. 68.

upright position. These closets are not subject to defects through frost, and do not require the use of fresh water for flushing. Another apparatus specially adapted for factories, schools, and places where it may be subjected to rough usage is the trough closet. This consists of a stoneware or white porcelain enamelled iron continuous trough, provided with closet seats at intervals in separate compartments, thus forming several closets. The floor of this trough is made with a slight fall towards the outlet, where it is again raised to form a basin to contain water, beyond which is a trap similar in construction to other closets (Figs. 67 and 68). It is generally flushed by means of a tank cistern working automatically, or the foregoing tipping arrangement can be used.

THE SALARIES OF SANITARY INSPECTORS.

WHAT MR. TIDMAN THINKS.

SIR JOHN HUTTON recently stated that the number of Sanitary Inspectors under control of the Medical Officers of Health in the county of London is about 200, each having an average of 3000 houses with 25,000 persons to look after.

Mr. Hy. Tidman, hon. sec. of the Sanitary Inspectors' Society, remarked to a *Morning Leader* representative that "a thousand houses to each man would be quite as much as he could manage. That meant testing at the rate of three or four houses a day, which with his many other duties would well occupy him."

The payment of these officials ranges from £91 per annum up to a maximum of £350, the lucky recipient of which is the Chief Inspector of Bermondsey.

The Public Health Committee of the London County Council have sent a recommendation to the Council that it should ask for the assistance of the Local Government Board in an endeavour to raise the rates of payment.

"The result of the present low salaries is," said Mr. Tidman, "that we get an inferior class of men in some cases. Battersea is now advertising for a man at £91—and for that sum he has to go through a training and pass a very trying examination."

"Another thing I should like to mention," he added, "is the failure of the Metropolitan Board of Works, and later the County Council, to make bye-laws for the regulation of drains. If that were done throughout the whole of the metropolis it would, besides being of great use to the Sanitary Inspectors by making one uniform system, be of general public benefit."

Many London parishes have an excellent staff of Sanitary Inspectors, but others need bringing up to the mark.

INCORPORATED

Society of Medical Officers of Health.

METROPOLITAN BRANCH.

AN ordinary meeting of the metropolitan branch of the Incorporated Society of Medical Officers of Health was held on Friday afternoon at the offices of the St. Giles's District Board of Works, 197, High Holborn. Dr. Gwynn (Hampstead), the president of the branch, occupied the chair, and those present included Drs. F. J. Allan, S. Davies, L. A. Bryett, S. R. Lovett, J. Herron, W. A. Bond, R. Dudfield, J. F. Sykes, H. L. Bernays, and O. Field (hon. secretary).

A communication from the Council of the Incorporated Society, submitting a series of questions as to the desirability of amendments in the law relating to the notification of infectious disease, was considered.

Among the alterations suggested was that measles should be added to the list of notifiable diseases, but the penalties on convictions were regarded as inadequate.

The London Building Act, 1894, Amendment Bill was considered.

Dr. ALLAN said that he thought Medical Officers generally would agree with the principle of the Bill.

Dr. SYKES pointed out the ultimate result of legislation of this character was to make the working classes a specialised class. But such Acts as these really stood in the way of better provision of dwellings for the working classes, for the conditions were so severe as to be almost prohibitive except for pure philanthropists. He thought that very few more working-class dwellings would be erected by private enterprise, owing to the competition created by the London County Council, and the County Council could after all only touch the fringe of the question. The effect would be to create a privileged class, for they had dwellings with more light and air than other classes could afford. The whole thing was a vote-catching business carried on by both sides, and it was not a commendable process. If there was a principle applicable in such matters it ought to be applied to all alike, and not to a section of the community only.

The CHAIRMAN remarked there was nothing they could object to in the Bill as Medical Officers of Health, and it was simply a question of politics.

The Midwives Registration Bill was also considered, but as this is before the Council, it was not thought necessary to discuss it at this juncture.

No action was taken in regard to either of the measures.

In accordance with notice of motion, Dr. R. DUDFIELD moved:—"That a communication be addressed to the Metropolitan Asylums Board, with a view to securing information as to the discharge of patients from their hospitals, and as to the removal of patients in the Board's ambulance from one sanitary district to another." He said that what was desired was three sorts of information, which would not involve much trouble, and they would be exceedingly useful. The first was that the Board should notify to Medical Officers of Health the removal of patients from one district to another, and he cited cases in which there had been great detriment to the community through this having been done. He also wanted regular notices of errors in diagnosis, of course, to be sent to him in confidence, and also the dates of the discharge of patients home. In London nothing of this was known at all, and the information would prove invaluable to Medical Officers of Health.

Dr. F. J. ALLAN seconded the motion, and reminded the members that at the last meeting of the Incorporated Society Dr. Goodall, of the Metropolitan Asylums Board, had emphasised the fact that patients were discharged with cautions not to at once mix with other members of their family. At present there were no means of ascertaining whether this injunction was carried out, and, in many instances, if the Medical Officer of Health knew of the discharge of the patient, he would be able to see that this regulation was enforced, thereby preventing the occurrence of many infectious cases.

The CHAIRMAN remarked that the question of the errors in diagnosis might lead to friction.

Dr. DUDFIELD said they would always be regarded as confidential.

The CHAIRMAN said that then they could not be made use of.

Dr. DUDFIELD rejoined that the only use he wanted to put them to was to verify his statistics and help to clear up inquiries.

Dr. ALLAN said it was done in many cases.

Dr. SYKES observed that the only thing that struck him was, that while he quite agreed with Dr. Dudfield's suggestions, whether they were not asking too many things continually from the Metropolitan Asylums Board. He felt, however, that the Medical Officers of Health were not enough in touch with the hospitals and hospital work in the metropolis, and it was an unfortunate position to be in. If there was to be a radical change in the Metropolitan Asylums Board, they should endeavour as Medical Officers to get into closer touch with the administration. He did not mean, of course, in any way to interfere with the management of the hospitals, but be in closer touch, to remove some of the existing defects of the system.

The motion was carried *nem. con.*

A hearty vote of thanks to the President closed the meeting, after several business matters had been disposed of.

Sanitary Inspectors' Associations.

THE NORTH-WESTERN AND MIDLAND.

THE thirteenth annual meeting for the present session of the above Association, was held at the Liverpool Royal Institution on Saturday, the 12th inst. The President (Dr. Vacher) occupied the chair.

The successful completion of the arrangements for amalgamation with the Carnarvonshire Sanitary Inspectors' Association was announced, and twenty additional members were elected. Some further routine business having been disposed of, the Chairman called upon Mr. Ernest Worrall, Mem. San. Inst., F.R. Met. Soc., Surveyor and Inspector, Penmaenmawr, to read his paper on "Some Public Health Problems."

Mr. WORRALL at the outset referred to the fact

that the previous addresses which appeared in the Association's "Transactions" for the current session, had been mainly of a technical character, dealing with specific subjects, so that it had been thought not inappropriate to conclude the series with a more general survey of some problems which concerned them as officers in the sanitary service.

A problem in public health procedure, and a many-sided one, too—one which affected the large and small governing bodies alike—was the complexity of English public health law. Scotland had obtained codification, and was in this respect distinctly in advance of her southern neighbours. When so important and influential a personage as Lord Russell described the existing confusion "disgraceful," ordinary people would anticipate an imminent attempt at improvement. Although sanitary law was not entirely omitted from the sessional programme of Parliament, several small and needed measures being included, these measures seemed likely only to make confusion more confused. Nothing but the total repeal of the whole of the existing enactments, and the inclusion of their necessary provisions in a concise, workable, and intelligible sequence, would meet their requirements. All this had been said, and better said, by others before, and it might be asked, What was the use of repeating it? The answer was that it was only by continual demand in season and out of season that they could hope at length to arrest a sufficient public attention to the subject to ensure its being seriously taken up by the Legislature.

The machinery devised or improvised to give effect to the present sanitary law, commencing with the Local Government Board, afforded just cause for complaint. The Earl of Kimberley, at all times a sober-minded speaker, recently stigmatised the position of affairs at the Local Government Board as "amounting to a grave public scandal." They would remember a recent circular-letter addressed to Urban and Rural Sanitary Authorities consequent upon two calamitous typhoid epidemics, urging them to inquire into and report upon their water supplies, and in case of doubt to at once take steps to remove the source of danger or provide new supplies. The circular was a very proper one, and conveyed the idea that those who directed its issue were in real earnest. It was difficult to reconcile that view with a subsequent fact. An Authority, within the area represented by that Association, being desirous of improving the water supply to portions of its district, prepared a suitable scheme and submitted it, together with the formal application to the Local Government Board. The Board's local inquiry was held, after a considerable lapse of time, and there was no opposition or question as to the merits of the scheme. A reason advanced in its support and for its speedy execution was the possibility of pollution of an existing supply. This was in December of last year, and up to the time of writing that paper the sanction had not been forthcoming. As to remedial measures, some proposals aimed at ending, and some worked for mending, the institution. As the executive officers in public sanitary work they could not afford to leave the discussion of this matter entirely to others. There were those who would allocate a very lowly portion to their share in the matter, but they believed that the day had gone by that the Sanitary Inspector only interested himself in bad smells and defective drains. Individually and collectively, and especially through the medium of an Association such as theirs, they could aim at higher things, and, with the experience gained in the course of the exceptional opportunities afforded by their daily work, they might prompt, as no one else could, the conclusions of those who would be responsible for the change when it was made. To safeguard and further their interests in commerce there was the Board of Trade, and to deal with matters concerning agriculture there was the Board having that name; the Navy also had its Admiralty Board. Important and necessary as these were, they were scarcely more so than would be a Department of Public Health.

It was no fault of the Local Government Board that, as now constituted, it was unequal to the task. As regarded its health work, it chief defect was that much of its work was in the nature of curative rather than preventive effort. It was a very good thing to have long and searching inquiries into causes of epidemics as the means of compiling reliable data for future guidance, but it would be a vastly better thing to make such epidemics less possible. What was wanted was a close, if not a closer, supervision by an authoritative department, with a responsible Crown Minister at its head, of many so-called Sanitary Authorities throughout the country. There was a real need for such supervision. The reign of Bumble had not ceased, as might be read almost any day in the columns of a Press report of Urban and Rural Council procedure.

The next problem to be considered was the absence of continuity in the *personnel* of the Local Sanitary Authority. As a whole, and in principle, the electoral system of representative government was not to be despised. It was the outcome, the only possible outcome, of the democratic advance, which would pass into history as the main feature of this expiring century. But good as the system was, it had some melancholy defects, chief among which from the sanitarian's point of view was the one referred to. Its immediate effect was the doing in a spasmodic and piecemeal way work which could best be done by constant systematic application. Its ultimate effect was to slow the progress of sanitation, to minimise the health and happiness of life, and to lessen the remoteness of death. It had been said that a Corporation had nobody to kick, that responsibility for wrongful acts of omission or commission could not be allocated to or felt by the individuals composing it, and sins against the public health formed the exception to the rule. It was otherwise when some one or two persons were directly responsible for all they did or left undone. Blame or merit was better understood by everyone concerned, and, consequently, there was better effort to deserve more of the latter, and little of the former. If such were a logical conclusion, the lesson, then, surely pointed to a means to the end, namely, individual authority.

A solution, and a tried one then, for the problem under notice was to invest the executive Health Officer with much of the authority now imposed upon his Committee of the Local Authority. An Inspector or Medical Officer worthy of his calling would, in the credit and confidence thus bestowed, bestir himself all the more to make his office a still greater power for good. A remedy of the kind proposed would necessarily carry with it the re-

moval of another brake on the procedure of Health Officers; one which would hasten sanitary advance and free the responsible official from worries that, in themselves, weighed down many a conscientious and zealous disciple of hygeia.

Mr. WORRALL also referred to the question of "security of tenure in office," dwelling on its extreme importance, but pointing out that it would be worth while, in supporting this proposal, to be at some pains in dissociating the personal element as much as possible, laying stress more upon the fact that it was the public, and not the officer, that would be most benefited by freeing him from self-interested or stupid opposition. Doubtless the eventual and permanent solution would be in the education of the public up to its need, and its very direct bearing upon a subject of vital interest to it.

The PRESIDENT initiated a discussion which proved to be of a very spirited character, the following members participating therein:—Messrs. Wm. Urquhart (Crewe), W. Bland (Urmston), W. Curry (Droylsden), R. John Hughes (Rhyl), H. H. Spears (Waterloo), and W. Stansfield (Manchester).

A hearty vote of thanks at the close was accorded Mr. Worrall, and with his reply the meeting terminated.

A meeting of the Association will be held at Stafford on the 26th inst. to consider the desirability of forming a special Midland centre, the recent increases in membership having, in the opinion of the Council, fully justified that step. The proceedings in connection with this meeting promise to be of an interesting character. Members arriving at Stafford Station at 12.30 noon will be met by Mr. Wm. Blackshaw, Assoc. M. Inst. C.E., Borough Engineer, and Mr. Jno. Evans, Chief Sanitary Inspector, Stafford, who will conduct the party over the sewage works, the Royal Brine Baths and the county building. A meeting will be held in the Shire Hall at 3 p.m., when in addition to the consideration of the special business above referred to, Mr. Arthur Kent, Assoc. San. Inst., Sanitary Inspector, Hanley, will open a discussion on "The Protection of Water Supplies." Tea will be served at the Dolphin, Stafford, at the conclusion of the meeting. The attendance of Midland Inspectors generally is invited.

BONNYBRIDGE.—The ceremony of turning on a new water supply for Bonnybridge was performed on Wednesday, the 16th inst. The duty of turning on the water was given to Mr. George Ure, of Wheatlands, the pioneer of Bonnybridge iron-founding industries, and a prime mover in obtaining the water supply which has been so successfully brought about.

LYDD.—The disinfector building is not only finished, but it is now fitted up with the disinfector apparatus complete. Fires have been lighted, and the efficiency of the apparatus tested during one or two days, and it appeared to answer its purpose excellently. As soon as the cart to convey disinfected clothes from the building is obtained the disinfector will be ready for use when required. The entire cost of building, apparatus, carts, and everything will probably not exceed £200. The situation is an excellent one; it is on the East Ripe, and distant some 200 yards or more south-west of the railway station.

LOOKING AHEAD: A PEEP INTO TWENTIETH CENTURY SANITATION.

By M. INGRAM, Manchester.

IT is a truism to say that the Victorian reign has been one record of scientific success, and that few sciences have made more rapid advances than that pertaining to public health, attention to which was caused by the lamentable illness of the Prince of Wales in the year 1871. Its progress since then has been little less than a revolution, if we but compare the progress (or want of progress) of ages with the good work accomplished since that epoch-making year—a year which may be described as the pioneer of modern sanitation, and the alpha of sanitary science, the practice of which is as varied in character as in its application to the habits and conditions of the people whose life and health it is desired to safeguard.

For reasons which it is unnecessary for us to enter into here, large numbers of people assemble together in our towns and cities in far too circumscribed an area, which circumstance makes it incumbent upon us to understand why certain diseases occur or exist under a certain set of circumstances and conditions, and are wholly absent and do not exist where the social and physical conditions are changed.

Let us make a comparison between a migratory and a stationary community. The former, most likely, would be pastoral in occupation, and by reason of attention to their flocks and herds would be constantly changing their quarters as pastures became bare; their habitations would doubtless be huts or tents which could be pitched near a clear and unpolluted spring, brook, or river, either of which would supply one of the necessities of life, whilst food—a plentiful supply—would be always at hand. Clothing suitable to their wants, the skins of their flocks would supply in abundance; from the inclemency of the weather their huts or tents would afford protection; whilst the atmosphere, unpolluted by man, would supply the other conditions of health. It is safe to assume that these people would live a natural and a healthy life, and the chances of longevity would be far greater than in a congested district, where, by the exigencies of employment, we must of necessity live in an atmosphere polluted by nature's calls, and by man's indifference to man.

We readily admit that the constitution of our society makes the natural state of our present-day existence not at all on all fours with the case first cited, nor can we ever hope, by the adoption of the best and most scientific means at any time at our disposal, to obtain conditions so favourable to health and so conducive to long life; but we do claim that much more can be done than is done in this direction.

"Earth to earth" has long been voiced both by sanitarian and agriculturist; it has much to recommend it, but its application to the wastes of civilisation has hitherto been a disappointment and loss to its advocates. There is, however, no reason why it should be abandoned, for the wastes of life and the organic refuse of civilisation must be quickly disposed of; in fact it is an elementary duty of all communities. The perfection, or want of perfection, of its collection and its disposal, reflects itself in the physical, moral, and social well-being of

such community—this is well understood. Were it not so, history would be false, science a sham, and legislation both foolish and futile, and the evidences of one's senses would be in vain.

Bad sanitation demoralises its environments; it pollutes the air as well as the water, each the most important element of life. Contamination of the latter has caused some of the most baneful of epidemic diseases, whilst the pollution of the former is one of the chief causes conducive to a lowered state of health, also to drunkenness, poverty, and not unfrequently to crime, for it is said that incapacity for work, and a disinclination to work, act with the same force, so that when one is present so also is the other.

From cause to effect we trace this fact—that the industrious classes feed and clothe an army of able-bodied paupers, tramps, loafers, and criminals, who "neither toil nor spin" (except when on the tread-mill), but who engage the larger portion of the time and energies of our civil governing bodies in protecting the other portions of community from influences inimical to the general well-being of the people at large.

For reasons unnecessary to enumerate here, towns and cities in this country are built upon the banks of rivers. Advantage has hitherto always been taken of this circumstance to get rid of the wastes of life by allowing it to enter into the flowing waters, irrespective of the injury caused to those residing on a lower level. This method obtains in the largest cities as well as in the smallest hamlets in this country.

We have in our mind a small village, all the houses of which are built on the verge of a beautiful clear stream, the source of an important river, the home of the lusty trout as well as of the beautiful kingfisher. The sanitary conveniences empty direct into the flowing stream, where you may see—if you have an observant eye—not infrequently one member of a family fetching water at the *front* of the house for the morning or noon-day meal, whilst another is polluting the stream at the *back;* and for many miles this river is both the domestic water supply and the outfall for sewage. When it reaches an important city some miles still further it is then little better than crude sewage.

This state of affairs should be condemned by all intelligent men, and should be absolutely forbidden by law. Law, however, is seldom in advance of public opinion. It should therefore be the duty of all sanitarians to educate public opinion, and so hasten legislation which will effectually prevent the pollution of our rivers and their tributaries by local Sanitary Authorities, who so flagrantly violate the laws they are now commanded to obey.

The ninteenth century has been so fruitful of scientific triumphs, that we shall be sorry to think that science is so impotent, engineering so helpless, and chemistry so played out, that no practical plan can be devised to hasten a revolution in the methods of collection and disposal of the wastes of life and domestic refuse, which will not be an improvement upon the plan now in operation in this country.

"Looking a-head," say, thirty or forty years, let us assume that education, both technical and scientific (which, thanks to a wise Government policy for half-a-century past, has made the great mass of the people in this country alive to their own physical welfare), has impelled them to join together and forced the Government to solve the sewage problem, which up to this time has been in the hands of local governing bodies, without either the power or the means to perform the duty imposed upon them.

It was seen how beneficial to the community had been the collection and distribution of our letters and parcels by Government organisation; it had been a national benefit. Could any one doubt a national system of sewage would be less so?

We can look backward from this forward period, and ask with astonishment how a so-called practical people could ever tolerate legislation which in effect prevented them as a community from doing that which the law commanded them to do.

How was it possible for Manchester, for instance, to collect and dispose of the wastes of life and other domestic refuse within her own boundaries without jeopardising the health and the lives of the whole community?

It was found impossible, and so opposition from adjoining Authorities, armed with similar powers, had to be purchased or fought in the Law Courts at great cost, which costs came out of the local treasury—whereas the benefits derived from improvement in public health, even of a single district, are of national importance, and should be so considered.

And so it came to pass that a national system of sanitation was established in this country. Let us imagine how it is applied.

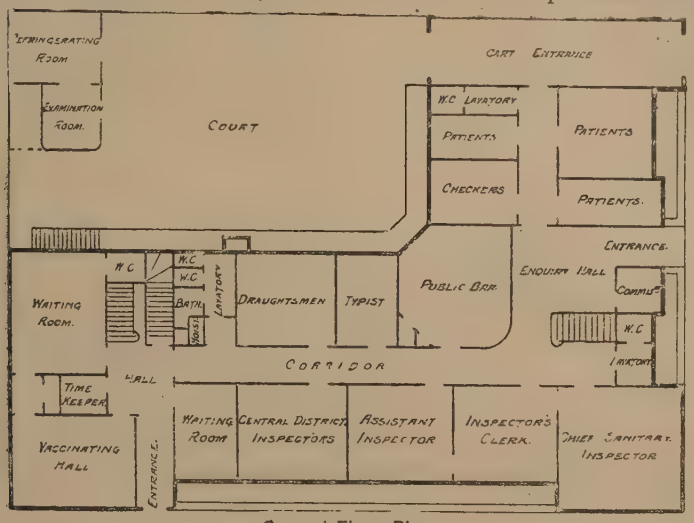
Its first and foremost principle is that every domestic dwelling in every town and city in the kingdom is to be cleared of its sewage and all other putrescible refuse at every hour of the day—in short, as soon as it is made; motive power for this purpose is provided at suitable centres of such towns or cities. There is no accumulation, therefore no stagnation, either in the house or any point of transit to such centres; all objectionable matter is removed the moment it is placed within an apparatus provided for it, both in each house and other convenient places; the matter is thus despatched to its proper centre before decomposition makes it injurious or offensive. On its arrival at its proper centre, it is still kept in brisk motion, and automatically, as it were, diverted to the direction it is desired, until it finally arrives at its ultimate destination—the land—where it gives back to the soil that which has previously been abstracted from the soil to produce it; and, enriched by such fertilising matter, who can wonder that agricultural depression is a thing of the past, and that our farmers, having abundant manure at hand, can and do compete with success with the foreigners in our home market, with profit to themselves and a benefit to the community at large?

In considering the question of nationalisation of sewage removal and disposal, it was seen that the whole kingdom was practically planned out, ready surveyed and levelled by the existing railways and the admirable public roads and highways which intersect and traverse every town, village, and hamlet in the kingdom. It was therefore decided that railways also should be nationalised, much to the advantage of the whole community.

(*To be continued.*)

GLASGOW NEW SANITARY CHAMBERS.

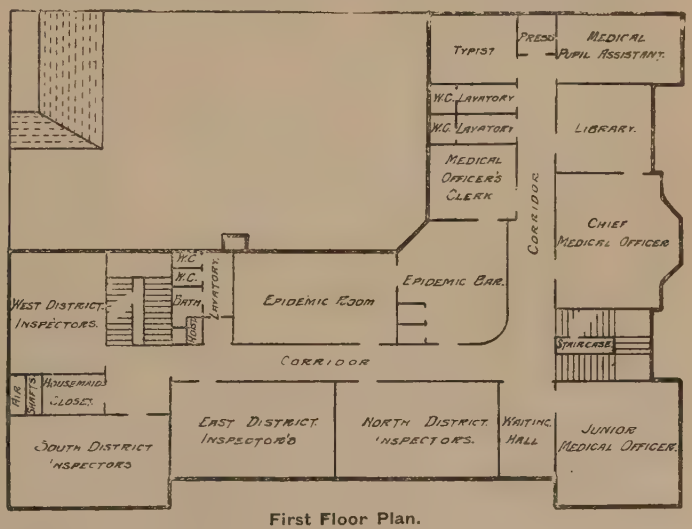
A BRIEF description of the new chambers which the Sanitary Staff have lately entered will be of interest to our readers. The foundation stone was laid on 25th June, 1895, and the staff removed to the new premises on 3rd May last. In THE SANITARY RECORD, May 1st, 1896, we gave a view of the elevation to Montrose-street. We have now the pleasure to submit ground plan details of three of the flats. The Sanitary Department of Glasgow, as at present constituted, dates from the year 1870, when the first Sanitary Inspector, Mr. Kenneth M. Macleod, with a staff of forty-five all told, was appointed. Year by year the staff has gone on increasing, until now it numbers 172, necessitating enlarged premises.



Ground Floor Plan.

A part of the basement of the building is devoted to store-rooms for the old books, documents, &c., one room worthy of mention being a fire-proof one where all the returns made by the Registrars to the Medical Officer during past years are arranged on iron shelves. These returns comprise births, deaths, and vaccination defaulters. The volumes are all bound in half-calf, and labelled in gilt letters so that they may be of easy access. Other store-rooms are devoted to oils, waste, sulphur, turpentine, and other material used in the smoke testing of drains. There are at present ten lads specially set apart for the testing of drains, under the supervision and directions of the assistant Inspectors. Each tester has a press or locker with a key, in which is deposited the smoke-testing machines, india-rubber tubing, and other appliances in connection with drain testing. A set of engineering and tinsmiths' tools are provided in the smoke-testers' room, so that any necessary repairs may be performed on the premises instead of having to employ, as formerly, outside tradesmen. Another apartment is set aside for the lime-washers of infected apartments. There are at present four of these men, who have been previously painters by trade. The quantities of whiting, colours, and disinfectants are supplied to them every morning by the man in charge of the premises. Each man carries a satchel, brush, and pole in his rounds, but at present the Health Committee have under consideration a method of adopting a motor car for disinfecting purposes. It may be stated that previous to the whitewashing process, the men who collect the infected clothing from the disinfecting station at Ruchill or Belvidere, as the case may be, carry out the fumigation of the apartments by roll sulphur mixed with a small quantity of chlorate of potash.

In the basement is situated the boiler and furnaces for heating the offices on the low-pressure steam system. The pipes are carried throughout the building, and each apartment has regulating valves. In the lobbies are several American radiators. Some of the apartments, a shown on plan, have fire-places. The ventilation is on the extracting principle. In the specially-constructed spaces in the bossings of the windows the fresh air passes from an external grating in the wall over radiators and is heated. The top of the casement has a perforated wire gauze and grating. The fresh air can be regulated by a shut-off valve with brass handle as may be deemed necessary. The exhaust atmosphere is drawn off by louvre gratings placed one about 3ft. from the floor in side wall, and one at the top of side wall next to ceiling. These louvres are regulated by a cord betwixt them. That is to say, one of them always remains open whilst the other is shut. Ducts run underneath each floor to a specially-fitted apartment on roof provided with



First Floor Plan.

two Blackman fans driven by electric motors. The building is lighted and the motors driven by electricity from the Corporation mains.

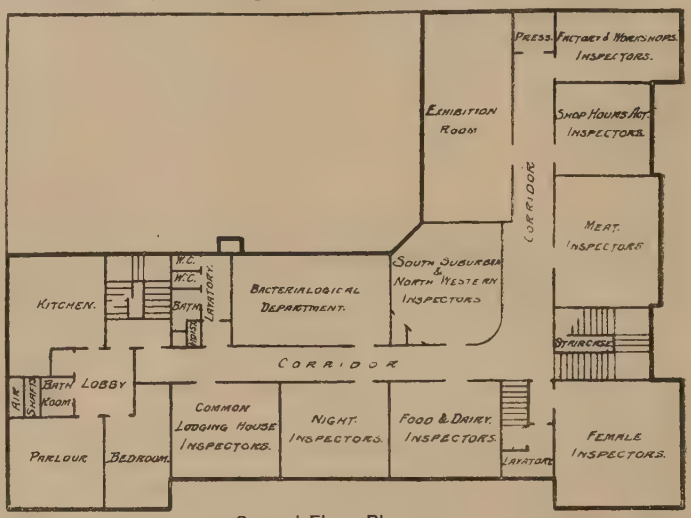
Each flat is provided with two wash-out closets, a set of three marble wash-hand basins with hot and cold water taps, and a bath for use of the employés. As will be seen from the plan, there are also other conveniences and lavatories for use in connection with the special apartments adjacent thereto.

The public entrance is by Montrose-street, and the entrance for the staff by Cochrane-street. Entering by the former, there is a spacious vestibule, the floors and walls of which have ornamental and coloured encaustic tiles. The public inquiry bar is at the end of this vestibule, provided with a sliding window. To the left is the Chief Sanitary Inspector's room, and in communication therewith the rooms for his clerk and Assistant Inspector. Keeping to the left, along the corridor is the room for the Central District Inspector and his assistants. On the right hand are the rooms for typewriter and draughtsman. Further along, at the Cochrane-street entrance, are three apartments devoted to vaccination purposes. One stair up are the rooms for the following District Inspectors and assistants, viz.:—Northern, Southern, Eastern, and Western, also room for Inspectors whose duty it is to look after infectious disease, which is an adjunct, and has access to "Epidemic" or infectious disease inquiry bar. Entering off this bar is the Medical Officers' clerk's room, and further in the passage is the room for Medical Officers' typewriter. The veterinary surgeon (a recent appointment) has an apartment adjoining that of the senior Medical Officer. The senior and the junior Medical Officers' rooms are near top of staircase. They and the Chief Sanitary Inspector's room are furnished with Stanley telephone instruments connected to every apartment in the building, so that they can converse with any of the staff from their writing tables.

On the top flat are the apartments for the following Inspectors:—Workshop, shop hours, butcher meat, Food and Drugs Act and dairy, night, port, and lodging-house. There are also two rooms at present being fitted up for bacteriological research, and a large apartment in which will be exhibited improved sanitary appliances.

The desks, writing tables, cabinets, presses, and indeed all the furniture is of Austrian oak, with the exception of the Medical Officers' library, which has an apartment to itself, and is of walnut. Great pains were taken by the city architect, Mr. A. B. Macdonald, and his assistants to have everything carried out in a substantial manner.

It should be mentioned that in the courtyard is a special building for the storage of unsound butcher meat when waiting the decision of magistrates. It is fitted with an ice chamber, hoist, &c. Entrance to this courtyard is obtained by Montrose-street, and this entrance is utilised for the removal of stray patients who are suffering from infectious disease, and have presented themselves at the office.



Second Floor Plan.

Institute of Sanitary Engineers.

SANITARY ADMINISTRATION OF BELFAST.

(*Continued from page* 289.)

Stables.—For the regulation of these there appear to be no published rules, though there is no doubt some understanding as to their supervision by the department. The City Surveyor has some rules for the building of new ones, at least to the extent that they may not be in contact with any part of a dwelling-house, and that they must be properly drained into a suitable tank, which must not be connected with the public sewers, but must be cleaned out periodically. I fear the condition of many of the stables and their yards in the town leaves much to be desired. It is not easy to say why there should not be a set of bye-laws to which, after a limited term of a few months' notice, *all* stables should conform. An impervious floor of square setts or paving bricks laid in cement, or else of concrete, should be a *sine quâ non.* Pebble paving should be abolished for all yards, and square setts substituted, or else the pebbles well grouted up nearly level with cement—a treatment both safe and extremely durable. There should be a minimum space, say, equal to 15ft. by 5ft. by 8ft. high, for each horse, which would give a cubic space of 600ft. The manure also should be removed from every place at least once a week. In all regulations such as the above it is seldom with the large establishments that difficulties arise. Such places are easily inspected, and their owners have both the means and the intelligence to enable them to respect the law. I have reason to suspect that amongst the petty owners of horses, and other animals as well, there is a great deal of evasion of even the rudimentary laws that at present exist.

Many a small tradesman who finds a horse, and in the case of still smaller ones, an ass, a necessity in his daily business, has the animal hidden away surreptitiously in very unsuitable places. It is by accident only, or espionage, that such breaches of the law can be detected. It has frequently seemed to me that, without any additional expense to the community, that intelligent body, the police, might

be utilised for this purpose. It is their duty at present to take cognisance of defaulters against the law, but possibly from the comparative novelty of sanitary law, they have hitherto regarded themselves as outside its pale. They are, at least officially, and generally also, in fact, in total ignorance of its defiance under their very noses, although they, like their fellow citizens, suffer from its neglect. No one would desire or expect that every policeman should be a sanitary expert, or have the training requisite for a Sanitary Inspector, but they might, without much difficulty be instructed in a list of a few simple things, as to which they need not, it may be, act themselves, but merely report, so as to put the regular Inspectors upon the track of investigation and, if necessary, action as might be found desirable.

The policeman on his beat has many opportunities for observation not open to the Inspector, and is moreover on the spot by night as well as by day, and there are many things on which a pair of eyes that need not be those of an expert would be of use. Such evasions as I have noted above are some of them. Another is the disposition of objectionable soil. The Inspector perhaps only hears or sees some days after an offence has been committed, and can then perhaps only obtain insufficient evidence to prosecute upon. The evil has been done, and can only be rectified with great difficulty, or not at all. The policeman would be always within sight. Another default, which especially in a wet climate is always unpleasant to the passer-by, and when it goes so far as to render the houses damp becomes in the sanitary sense a "nuisance," is the leaky state of so many eave-spouts and down-pipes. In fine weather such things are easily missed or forgotten, but the policeman who is on his beat in all weathers has many an opportunity for taking notes.

The administration of these bye-laws that we have discussed above does not by any means include the whole, or even the greater part of the work of the Public Health Department. The Acts upon which these bye-laws have been chiefly framed are special and particular, inasmuch as they apply in the main to certain classes only of the community, but the Public Health Act itself is in its operation universal, and may be supposed to embrace within its scope all those classes who are not affected by the former. From this general nature of its application it is clear that it cannot go so much into particulars as some of the former Acts, but must leave a great deal to the individual opinion and discretion of those who administer it. For the protection of the public, on the other hand, it gives more latitude of interpretation and decision to the magistrates and others of the Judiciary, with whom rests the power of enforcing the law. In other words, the infringement of a specific clause, for instance, as to size or material is a very simple matter of evidence, and can easily be proved either yes or no; but the question whether a certain house is, or is not, fit for human habitation depends frequently upon a number of conditions and of collateral circumstances, and admits quite legitimately often of evidence very conflicting in its character.

In the smaller and worse class of houses inspection is as frequent and regular as the strength of the inspecting staff will permit. The better class houses practically receive no regular inspection, except upon some specific complaint. Such, however, are promptly attended to, and freely investigated by the Department, including where needful the testing of the drains. Where defects are discovered the owner is ordered to have them remedied, and I suppose the aid of the law would be invoked in the case of persistent non-compliance. As typical of the class of work that goes on, I may give the report for one month early in last year, which happens to be the one nearest to hand. During that time orders were made for twenty yards to be tiled, thirty gulley traps to be inserted, eighty-three privies and ashpits to be repaired. Action was also taken with regard to the water-closet accommodation in certain factories. In addition an insanitary court was with the consent of the owners closed. As an instance of the manner in which private interests are safe-guarded under the Public Health Act, and the difficulties which stand in the way of rapid action on the part of Sanitary Authorities, I may give a case in which I was to a certain degree interested.

Some three years ago a narrow court containing ten houses (of two rooms, one below and one above, in each) came under the notice of the department, and a summons was issued and the case brought before the magistrates. The yards were most of them extremely small, the combined privy ashpits abutted against the house wall, and the only means for removal of the contents was through the houses, which were generally in a dilapidated state. After much evidence, medical and other, upon both sides, it was arranged that if the ashpits were separated from the houses and some other repairs made they might still be occupied. Recently they again came under public notice, and this time an application was made definitely to the Court for their closing. After hearing the evidence *pro and contra*, and the magistrates taking the unusual step of visiting the court, an order was made for the closing. Curiously enough, there has been no case of infectious or, I believe, zymotic disease in the court for many years, the mortality being due to the poverty or intemperate habits of the inmates, attracted to the place by the extreme lowness of the rents. I have quoted this case at some length, because in the first place it shows some of the difficulties in the way of summary action on the part of the department, and one which they have themselves quoted in reply to inquiries as to why they have not been able to do more in the way of improvement.

It took three years to close a court which admittedly had many undesirable features. The magistrates had first to be convinced of the necessity, and after one decision and the improvements consequent thereon, it is evident that further legal proceedings could not be originated with any fair chance of success until after some reasonable lapse of time. It opens up, in the second place, a question of some importance as to what really constitutes a house unfit for habitation, and upon what lines the Sanitary Authority should act in such cases. In general they seem to rely upon a cumulation of bad features to establish their case, and not unnaturally perhaps it is not always those that are actually the worst which receive the greatest pre-eminence, but rather those most calculated to influence the bench. For instance, a limited yard space cannot by itself, however undesirable, be honestly declared to make a house uninhabitable,

although the proximity, and still more the actual contact of a foul refuse pit may. Again, the state of the yard is of much greater importance than its size. A perfectly impervious bottom is of far more sanitary value than a few square feet of space, and a pit covered from the rain and containing little else than dry ashes, 2ft. or even less from a house, is less objectionable than a larger one open to the wet, and with other more undesirable contents, although at three times the distance. Were absolutely impervious ashpits dry because covered, impervious pavements to yards, and the substitution of water-closets for privies, insisted upon in the case of every house, the size of yard question might be left to solve itself, and a closing order need hardly ever be applied for, because all houses which it would not pay to, or which were incapable of being so converted, would close themselves.

It must always be borne in mind that the exigencies of labour, and the extension of business premises in the centre of every large town, render it increasingly difficult for a large class of labourers to find a residence near their work, and the competition for small houses anywhere near the centre of the town renders perhaps landlords more indifferent to their tenants' welfare than they otherwise would be.

A Public Health Department is therefore doing no more than its duty when it imposes rigorous conditions of sanitation in such cases, it is not acting judiciously when it makes these conditions of such a nature as to drive this class of houses out of the field altogether.

The subjects we have discussed hitherto may be considered as among the commonplaces of sanitary administration, and represent for the most part the every-day routine of the department, but there are many branches of its work of equal, and some of them even of greater, importance. Foremost among these, and one which sometimes tries the powers of the officials to the utmost, is the dealing with infectious disease. Upon this question the Corporation of Belfast must certainly be admitted to have been somewhat backward, although it would certainly not be fair to include the officials in this charge. They have been year after year now for a considerable time urging upon the Corporation the importance of the adoption of the Infectious Diseases Notification Act, but it was only at the beginning of last year that they succeeded in persuading them to do so. Perhaps the pressure of the officials might have been stronger but for the fact that the Corporation had no infectious hospital, the only one in the city being attached to the workhouse, and under the management of the Board of Guardians. Under these circumstances, and until the Medical Officer of Health could succeed in convincing the Council of the necessity for such a hospital, he may naturally have felt that the notification would be robbed of half its value. The Corporation has now resolved upon the hospital, and fixed upon a site, and it is to be regretted that legal, or at least technical difficulties, which it may be hoped will soon be overcome, should have prevented its commencement. But the adoption of notification, and the possession of the finest possible hospital, really means only the commencement of the work, the critical question is to get all this machinery made use of by the class for whom it is intended.

And here many difficulties confront us. In proportion generally to the needs of the poor is their ignorance. Their prejudice against hospitals has been met with in many places, and certainly is no less in Belfast than elsewhere. In the matter of infectious disease also their ignorance renders them much less alive to the necessities of isolation than a better educated class would be, although in certain cases and certain diseases, especially of an unusual type, the same ignorance may manifest itself in an unreasoning panic against infection. When the proposed site was fixed upon, a spot about three miles from the town, the Medical Officer of Health obtained from a number of places replies as to whether any inconvenience was found from having the hospital at such a distance, and in nearly every case the answer was that none was felt. It seems nevertheless only natural that the poor should feel rather more reluctance to allow their relatives to be removed to a distance, practically out of reach of their friends, than they would to a place in or nearer to the town.

This raises the interesting and important question as to the adoption of compulsion, and if so whether it is to be, or could be, carried out upon all classes alike, and, if not, where to draw the line, certain as it would be to mark an invidious distinction between rich and poor. I am not sufficiently acquainted with the practice of other places to say, but it seems a great responsibility, and rather an arbitrary power, to be left in the hands of a single Medical Officer, though any other procedure might involve a serious and sometimes dangerous delay. There is the further question of the isolation of the other members of a family, among whom there may be risk of infection, which would often involve the temporary idleness of the bread-winner. I do not know how far it may be legal, but it would be quite in harmony with the spirit of the law as regards contagious disease and the slaughter of animals, to offer some definite but moderate compensation for such compulsory isolation, and the community would certainly in the long run be gainers by so doing.

In the matter of disinfection the operations of the department appear to be wisely and skilfully applied. In connection with the fever hospital at the workhouse is an excellent disinfecting apparatus of the Washington Lyon of superheated steam, worked in connection with the hospital laundry, and by a subvention made annually the Corporation have the use of this, and arrange for the disinfection of bedding, textile, and similar fabrics from any part of the town. In this apparatus, as you know, the disinfecting chamber opens upon one end into the receiving-room, and upon the other into the despatch-room, there being no connection between the two except through the chamber, into which the superheated steam is introduced several times and withdrawn, thus creating through the fibres and interstices of the fabrics a vacuum, which the steam upon the next admission necessarily penetrates. Under this process, however closely the disease germs may lurk, they are certain to be destroyed. Disinfection of houses is effected with carbolic vapour, by means of an apparatus patented by Mr. Conway Scott, C.E., the chief executive officer. His experience now for many years has been that carbolic vapour thoroughly applied is the best and surest method of house disinfection.

(To be continued.)

General News.

NOTICE.—On and after 31st March next the Annual Subscription to this Journal will be raised to 12s. 6d. to all NEW Subscribers. NO ADVANCE will be made to our friends whose names are entered on our Subcription list prior to that date, so long as they continue to Subscribe.

BOOTLE.—A water scheme is required for Kirksanton Green.

ANNAN.—The erection of a public slaughterhouse is still under the consideration of the Town Council.

SUTTON-IN-ASHFIELD. — The Urban District Council is applying for permission to obtain a loan to construct public baths.

NEWTON ABBOTT.—The Local Government Board has sanctioned the expenditure of £800 in providing a water supply for Bishopsteignton.

CHARMOUTH.—The approval of the Local Government Board is to be obtained to a loan for carrying out the proposed additional water supply for Charmouth.

FAIRFIELD.—The Urban District Council has decided to apply at once for a loan of £2000 for the waterworks purposes, and to start the work immediately.

CRAY. — The Swansea County Council has accepted the tender of Messrs. John Peterson and Sons, Glasgow, at £255,747 odd, for the new Cray waterworks scheme.

CREWE.—Measles have become so prevalent at Crewe that it has been found necessary to close four of the schools. There are between 500 and 600 cases, and deaths are being reported every day.

LOWESTOFT.—A Local Government Board inquiry has been held respecting an application by the Town Council for powers to borrow a sum amounting to £1400 for the purposes of extending the existing building used as a Sanatorium.

NORTHWICH.—It was reported to the Urban Council at its last meeting that at present there is no necessity to close any more of the elementary schools on account of the measles. Upwards of 200 cases have occurred, but it is believed that the epidemic is now on the wane.

CARNARVONSHIRE.—The influenza epidemic is working serious ravages in Carnarvonshire. About a thousand men engaged at the Penrhyn slate quarries at Bethesda are down with it, and almost the like state of things prevails in the Llanberis district. At Bangor there is hardly a house free from it.

EDINBURGH.—It has been reported to the Public Health Committee that during February there had been thirty-four seizures of unsound meat in Edinburgh, none of them, however, being of meat exposed for sale in shops. The total amount of meat seized was 10,678 lb. Six cows—three in city byres, and three brought in from the country—were condemned for tuberculosis. Under the new Public Health Act, one live cow had been seized at an auction mart in town.

ALVASTON.—The Alvaston and Boulton District Council has agreed that steps should be taken to secure a site for the erection of an isolation hospital.

WATERFORD.—At a recent Town Council meeting the proposed erection of a public abattoir was discussed. A strong opposition by city victuallers caused prolonged discussion on the subject, which was ultimately postponed.

STROUD.—The Local Government Board has sanctioned the borrowing of £4500 for the erection of public offices, and £150 for land in connection therewith, and also the borrowing of £600 for the purchase of and repairs to the baths.

DUNGARVAN.—Dr. Brown, Medical Inspector of the Local Government Board, has held an inquiry into the proposed scheme for a water supply to Ballyduff and into the area of charge. The total cost of the contemplated scheme is £1500.

WORKSOP.—At the last meeting of the Urban District Council, the Surveyor, Mr. T. Kidd, presented an estimate for the requirements for the establishment of a health department, amounting to £1560, and it was decided to obtain a loan for that sum.

BANBURY.—The Town Council, acting upon the advice of the Chairman of the Streets Committee and the Borough Surveyor, has placed an order with Messrs. Aveling and Porter for one of Morrison's patent scarifiers to be attached to its 10-ton steam roller.

HEAVITREE.—A largely-attended meeting of ratepayers was held last week, convened by a circular inviting them to offer an "indignant protest against the shameful and unnecessary waste of the ratepayers' money" by the proposed erection of an isolation hospital, at a cost of £2500, by the Urban Council.

DRIFFIELD —The annual report of Dr. Wood on the health of Driffield states that during the past twelve months 155 births and 102 deaths were registered, the birth-rate being equal to 27·1 per 1000, and the death-rate 17·8, which compares quite favourably with the rate throughout the country for urban districts.

NEWCASTLE.—At a special meeting of the Tyne Port Sanitary Authority held recently a report from the Hospital Committee was discussed at length with reference to the Authority's hulk Alliance, which was practically worn out and unfit for further use. The hulk had been inspected and found unfit to bear the weight put upon it, whilst the superstructure was unfit for habitation, and had been removed. The Committee had inspected the arrangements of the Tees Board at Middlesbrough, and now recommended that the hulk be replaced by a pontoon 160ft. by 40ft. by 7ft. deep, carrying the necessary erections for the administrative block in connection with the Floating Hospital, including offices, caretakers' rooms, nurses' quarters, &c. It was also proposed to remove the Floating Hospital further south, and to place the pontoon next to the river, with a connection with the hospital. Mr. Black (of Sir W. G. Armstrong, Whitworth, and Co.) had prepared plans and estimates of a pontoon in steel which amounted to £3190. It was finally agreed to forward the plans to the Local Government Board, with a request for permission to borrow £3500; and also for an early inquiry, as the matter was urgent.

Personal.

MR. H. HILLIAM has been appointed Inspector of Nuisances for the rural district of Kelton.

MR. H. HILLIAM has been appointed Inspector of Nuisances for the rural district of Easton.

MR. J. R. BAGSHAW has been appointed Sanitary Inspector for the Lewisham sanitary district.

MR. T. C. LAWSON has been appointed Medical Officer for the fourth district of Devizes union.

MR. W. P. JONES has been appointed Inspector of Nuisances for the urban district of Glyncorwg.

DR. JAMES SHIMELD has been reappointed Medical Officer of Health for the urban district of Ilford.

MR. LLEWELLYN JONES has been appointed Inspector of Nuisances for the urban district of Holywell.

MR. WM. TRIPP has been appointed Inspector of Nuisances for the urban district of Bishop Stortford.

MR. M. C. WARNE has been appointed Inspector of Nuisances for the rural district of Maldon.

MR. F. POOL has been appointed Inspector of Nuisances for the urban district of South Bank-in-Normanby.

THE salary of Mr. Wilson, C.E., Surveyor for the rural district of Cockermouth, has been increased by £50 per annum.

THE salary of Dr. Annis, as Medical Officer of Health for Huddersfield, has been increased from £400 to £500 per annum.

MR. HARRY MASON APPS, F.I.S.E., A.S.I., has been appointed Sanitary Inspector to the Hollingbourne (Kent) District Council.

MR. WARD has been appointed Borough Surveyor for Derby, at a commencing salary of £600 per annum, increasing by £50 a year to £750.

MR. BENNETT has been elected Sanitary Inspector for the rural district of Hinckley, at a salary of £50 per annum, and Surveyor, at £50, for twelve months.

MR. SAMUEL BROADHEAD, of Stockport, has been appointed Surveyor and Sanitary Inspector under the Milford Haven District Council, in place of the late Mr. W. Summers.

MR. WILLIAM WATSON, Assistant Surveyor, Arbroath, has been appointed Burgh Surveyor, Water Manager, Sanitary Inspector, &c., for the Burgh of Maybole, at a salary of £120 per annum.

MR. S. E. BURGESS, A.M.I.C.E., Surveyor to the Stoke Newington Vestry Council, London, N., has been appointed Borough Engineer and Surveyor to the County Borough of South Shields, at a salary commencing at £500, rising by annual increments of £25 to a maximum of £700.

MR. GAYTHORNE YOUNG, of Romford, Essex, has been selected for the position of Analytical Chemist at the Great Northern Plant Works in Denaby, in the place of Mr. J. W. Young, who, has resigned the appointment in order to take up a more lucrativepost at Newcastle-on-Tyne.

Sewerage Schemes.

[TO MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

THE Helston Rural District Council is applying for permission to borrow £500 for carrying out sewerage works.

THE expenditure of £1000 is necessary at the Walsall sewage farm for the re-laying of drains which have gradually become choked.

A LOCAL Government Board inquiry has been held at Sherborne to inquire into the reports upon a sewerage scheme, for which borrowing powers to the extent of £8000 were asked.

THE Rural District Council of Lanchester has instructed its surveyor, Mr. J. R. Lupton, to prepare plans, sections, and an estimate for the sewering of Cornsay village, Co. Durham.

THE Huddersfield Town Council has instructed the Borough Surveyor to prepare a report specifying the manufactories discharging trade effluents into the sewers, the nature of the effluents, and the mode and channel by which they are discharged.

A SCHEME of sewers and sewage disposal by precipitation and filtration for Roade, Northampton, prepared by Walter Shaw, engineer, The Drapery, Northampton, has been sanctioned by the Local Government Board. The work will be constructed on the "Cosham" system.

THE Urban District Council of Otley (Yorks) has received a letter from the Local Government Board in connection with the application for sanction to borrow £4000 for the improvement of the sewage disposal works, stating that as the scheme as proposed would not provide for the effectual purification of sewage at the outfall, the Board was not prepared to sanction any loan for the scheme.

A LOCAL Government Board inquiry has been held at Norwich into the application of the Town Council for sanction to borrow £12,500 for working of sewerage. It was explained that the Corporation were the owners of a large sewage farm at Whitlingham, two miles outside the boundary of the city, on the south-east side, 503 acres in extent, laid out for broad irrigation. The effluent was almost entirely absorbed by the land, and scarcely any found its way into the river Yare. The Corporation were re-sewering their city, and by their local Act of 1889 they had borrowed £80,000. Since then they had borrowed £72,000. The rapid increase in the outlying parts of the city necessitated an extension of the system, and it was on account of this extension that the present loan was asked for.

THE Local Government Board has written the Newton Abbott Rural District Council refusing to sanction the application for leave to borrow £600 for works of sewerage and sewage disposal at Ipplepen, and stating that in the opinion of the Board the scheme is incomplete and unsatisfactory. As, however, the parish is clearly in urgent need of a proper system of sewerage and sewage disposal, the Board suggested that the District Council should consult a competent engineer with a view to the preparation and submission to the Board of a satisfactory scheme.

THE Rivers Committee of the Manchester Corporation, at a meeting in the Town Hall last week, had under consideration the proposed biological scheme of treating sewers which was recommended for adoption by the effluent sub-committee, who has had the matter under consideration. The cost of the new scheme is estimated by some members at as little as £60,000, but this amount is largely exceeded in the estimates of the City Surveyor (Mr. De Courcy Meade), who has been instructed to prepare plans of the new bacteria beds proposed to be erected at Davyhulme. The Committee resolved to begin experiments with the system on an area of four acres only. If the tests to which the scheme will then be submitted prove satisfactory to the Committee and the Mersey and Irwell Joint Committee, it is considered likely that it will be finally adopted. The Committee also decided to ask the Mersey and Irwell Joint Committe to sanction an extension of time for carrying out the necessary works.

A LOCAL Government Board inquiry was held on Tuesday, the 15th inst., into the application by the Sherborne Urban District Council for sanction to borrow £8000 for works of sewerage and sewage disposal. Mr. Thomas Farrell, the Council's Engineer, gave evidence as to the new outfall and other sewers to be constructed, and stated that the purification works are designed on the latest and most improved system. The sewage on leaving the 2ft. outfall sewer passes into screening and detritus chambers, then to mixing chambers, and thence into two Candy circular precipitation tanks, 23ft. in diameter by 13ft. deep, fitted with automatic sludge removal apparatus, and finally on to the oxidising and aërated polarite filter beds. The two precipitation tanks have a capacity of 40,000 gallons each, and are capable of efficiently treating upwards of 400,000 gallons per day, and the four polarite filters, each of 136 square yards, will effectually purify 500,000 gallons per day. On account of the small tank and filter bed area required for the "International" process the system is the most economical, it being much cheaper than those methods which involve the use of very large areas of tanks and filters. The International Company's constantly aërated polarite beds may be described as the highest form of biological filter, effecting rapid purification by oxidising the organic matter, the results obtained by the oxidation and aëration system of filtration (originated and successfully carried on by the International Company for many years) being now generally attributed to the action of bacteria.

THE Local Government Board has sanctioned the borrowing by the Rural Council of Chadwell St. Mary, of £250, for the purpose of extending the sewer in the Church-road. This work of extension has been greatly needed for a long time past.

THE Brightlingsea District Council has decided to adopt a sewerage system, and to apply to the Local Government Board for £9000 to carry it out. Originally the Council proposed a scheme estimated to cost £6000, and the proposed outfall was into a fleet which debouched into Brightlingsea Creek, very close to a number of oyster beds. The oyster merchants raised opposition, and the Local Government Board, when approached, suggested an extension whereby the outfall should be into the lower reach of the Colne, about a mile away from the mouth of Brightlingsea Creek, and over two miles from any other spot where oysters were laid down for the market. The Local Government Board insisted absolutely, at the same time, upon other particulars with reference to the discharge of the effluent, and on the necessity of an entirely separate storm-water system being provided. The Clerk and Engineer to the Brightlingsea Council had an interview with the officials of the Local Government Board, and subsequently plans were prepared estimated to cost £9000. These plans included treatment of the sewage by what is known as Ive's system, and discharge into the Colne under the conditions indicated.

Lighting.

TORQUAY was lighted with electricity for the first time on Thursday evening, the 17th inst.

CONSIDERABLE alterations are to be made at Kilwinning Gasworks, including new retorts and chimney, and plans for the same have been passed by the Commissioners.

AT a recent private meeting of the Wednesbury Town Council it was decided by a large majority to oppose the application of the Midland Electric Corporation to the Board of Trade to supply the district with electricity.

THE Stirling Police Commissioners have asked Mr. R. F. Yorke, electrical engineer, Stirling, who has successfully introduced the electric light to Fort William, to give them a report on the water power available at their reservoirs for the electric lighting of the town.

THE Darvel Burgh Commissioners have been in negotiation with the Gas Light Company for some time trying to arrange terms for the purchase of the works by the burgh. This was agreed upon at an adjourned special meeting of the Gas Light Company held on the 17th inst., the terms of the purchase scheme being 25s. per share, to be paid over on June 1st next.

MR. MUNRO, in his report to the Gourock Burgh Commission, estimates that the cost of laying an installation of electric light in Gourock will be about £8600. This includes plant, sufficient to light the whole of the burgh, and the erection of sixteen arc lamps along Shore and Kempock-streets.

THE Electricity Committee of the Glasgow Corporation has accepted the tender of Messrs. Babcock and Wilcox, Limited, to provide and erect at the new electricity generating station, Port Dundas, two of their patent boilers of about 1000-horse power each, with relative superheaters, at the price of £2020.

AT a recent meeting of the Watching and Lighting Committee of the Aberdeen Town Council, a communication was submitted from the City Electrical Engineer regarding the proposal to extend the electric light in George-street as far as Hutcheon-street. The Engineer reported tha the Gas and Electric Light Committee had not yet decided to extend the mains in George-street, and in these circumstances the Committee decided to drop the matter meantime.

THE fate of the Hackney Electric Lighting Order is still undecided, and there does not seem to be any immediate prospect of the Vestry taking a decided step. The proposals of the Joint Committee for handing over the electric lighting and dust destruction to one of the three firms who have tendered to carry out the scheme were discussed by the Vestry on Wednesday, the 16th inst. After two hours' heated discussion the Vestry seems to have got no nearer to a settlement, and by a very close vote the question was again adjourned for a fortnight.

THE deputation of the Bradford Corporation which is now visiting the Continent for the purpose of picking up ideas on the subject of electric lighting and motive power has met with an unusual misfortune. Mr. A. H. Gibbings, the Electrical Engineer, who has accompanied the Mayor and Messrs. Shaw and Dixon on this tour, has been seized with illness in Brussels, and is confined to his bed. His companions have taken every possible measure to secure his speedy recovery, but at the best some days must elapse before Mr. Gibbings can get about again, and in the meantime all further movements of the deputation are suspended.

THE Electric Lighting Sub-Committee recommended to the Leamington Town Council at a recent meeting, that in view of the favourable report made by Mr. Robert Hammond, the electrical expert, the supply of electricity in the borough be undertaken by the Corporation. The Sub-Committee further recommended that the Corporation should not oppose the insertion of a clause in its Provisional Order that it should take over that portion of the undertaking of the Midland Electric Light and Power Company, Limited, which would be of use to the Corporation for the purpose of its undertaking. The Committee's report was adopted.

THE decision of the Ilford District Council to give the incandescent gas system a trial will be very welcome to all inhabitants, and it is to be hoped that the system will be found not only to be a success from the lighting point of view, but also economical to the ratepayers. So far the few lamps placed about the town as an example seem to most amply justify an extension of the system.

A SELECT Committee of the House of Lords sat on Thursday, the 17th inst., to consider the competing Bills of the Morley Corporation and the Morley Gas Company, under which the former seek to acquire the gasworks, while the gas company resist the proposals and ask for extended powers. Mr. Charles Scarth Mayor of Morley, stated that he believed the passage of the Bill of the Corporation would be an advantage to the ratepayers. He considered it expedient that the supply of gas should be in the hands of the Local Authority in the same way as the water supply was. The feeling of the town was almost unanimous in support of that view.

Correspondence.

We do not in any way hold ourselves responsible for opinions expressed by our correspondents.

RELATIVE COST OF WORKS OF SEWAGE DISPOSAL.

(*To the Editor of* THE SANITARY RECORD.)

SIR,—In our letter to the SANITARY RECORD of the 18th ult. we had no intention to disparage the excellent work which is being done at Sutton, and certainly no wish to wound the susceptibilities of anyone connected therewith. We are therefore not a little surprised at the tone of the opening remarks of Mr. C. Chambers Smith's letter in last Friday's SANITARY RECORD. We are told in that letter that "the Sutton process is not a proprietary one," but "may be copied by any other Council without payment of royalties to any patentees;" yet for merely framing an estimate of the cost of this system as applied to our own city we are accused of "overstraining license"! If we had gone out of our way to initiate a discussion on the relative merits of the two systems, we could, to some extent, understand Mr. Smith's indignation; but we have not done so. As many of your readers are aware, statements have been widely circulated to the effect that our process is more costly than that in use at Sutton. We do not for a moment suggest that Mr. Smith has so far "overstrained license" as to make any assertion of this kind; we merely state a fact which has again and again been brought to our notice. When the statement referred to found its way into your columns, coupled with an invitation to furnish figures on the subject, we thought it due both to your readers and ourselves that we should do so. So anxious, however, were we to avoid any misstatement of fact or injustice to the Sutton system that we sent a copy of our letter to Mr. Dibdin before publication. We would gladly have extended the same courtesy to Mr. Chambers Smith if we had had the slightest sus-

picion that he would have felt aggrieved by anything we had said.

Although Mr. Smith casts doubts on our estimate, even going so far as to question our competence to form an estimate, he has made no attempt to correct or contravert our figures. He has, indeed, given some very interesting particulars of the cost of the works at Sutton. We are fully aware that at Sutton the circumstances are peculiarly favourable for the construction of filters at a minimum of cost; and that the clay from the excavation for the filters served, after burning, as the filtering material. The Sutton Council are to be congratulated on their opportunities for doing work so cheaply, and on the skill with which these opportunities have been utilised. But is it fair to take a case in which these exceptional facilities exist, and because the cost per 100,000 gallons in this case seems to be somewhat less than at Exeter, to make the sweeping statement that the latter system costs more than the former? Surely the only fair way in which a comparison can be made is to place the two systems "on a common basis," as you yourself suggest in your editorial note. We therefore took a case with which we are well acquainted—that of Exeter—in which very careful estimates had already been prepared, and showed what the effect would be of substituting coarse-grain filters for the Septic tanks. In spite of Mr. Smith's strictures we consider that we are fully qualified to form an estimate of the cost of such works in Exeter; and we certainly yield to no one in our desire to do full justice to the Sutton system. Had we wished to state our case as strongly as possible there are several points on which we might fairly have made the comparison more favourable to ourselves.

We may add that we have compared the cost of tanks and filters in several other cases in which estimates have been prepared, and that the result which we have found in the case of Exeter holds good in every instance. Even where the contractor's price for filtering material is lowest, the substitution of coarse-grain filters for the Septic tanks would add very considerably to the cost of the works—that is to say, tanks and filters and royalty cost considerably less than fine and roughing filters alone. Our royalty, by the way, is not, as stated by Mr. Smith, fixed at 30 per cent.

With a view to meet Mr. Smith on his own ground, we will take his own comparison, that of Exeter with Sutton, as regards the main question at issue, viz., the relative cost of the tanks and the coarse-grain filters which replace them at Sutton. The tanks at Exeter will deal with 5,724,000 gallons per day; but in our letter we merely claimed the flow dealt with by both tanks and filters, *i.e.*, 2,500,000 gallons per day. The tanks will cost £3750, equal to £150 per 100,000 gallons, reckoned on the lower duty. No engineering is included; so, for the sake of comparison, Mr. Smith is entitled to add to the cost of the tanks engineering charges at the same rate as in his figures for Sutton. If the coarse-grain filters at Sutton are taken as costing only one-half of the cost of the installation, or £195 per 100,000 gallons, this is more by £45 (less engineering) than the cost of the tanks provided for the same work at Exeter. We do not attach much importance to this comparison, holding as we do that the only fair way to compare the two systems is to see what both work out at for the same case; but since Mr. Smith has chosen the method in question, we thought it right to show where it leads him.

He refuses to admit our suggestion that the cost of the tanks may be reduced under certain circumstances, but for the purpose of the comparison which he makes, we are certainly entitled to reduce the flow through the tanks from 5,724,000 gallons per day to 2,500,000. Their cost will then bear some reduction, though not in the same proportion. The extensive system of penstocks, conduits, &c., all of which are in duplicate, and laid out to pass the larger flow, will also be considerably reduced in cost, and the long by-pass conduit provided to carry the surplus 3,224,000 gallons past the filters would be done away with. Another possibility of saving which we had in mind in our remarks quoted under this heading was in connection with the expenditure included in the Exeter estimate for the protection of the works against floods.

(6) We can assure Mr. Smith that this point is a very practical one, as even the 2ft. necessary for the Sutton system are not always obtainable, and in such cases the saving even of 1ft. is an important matter. The reduction in fall would, of course, necessitate an increase in the area of the filters. If coarse-grain filters were adopted at Exeter, and we had to divide between two sets of filters the fall now available for the fine beds, the additional land over and above that required under the present scheme would cost over £2800, or more than three-quarters of the cost of the tanks. This is on the assumption that a certain cubic capacity of filter must be provided for a given amount of work, whether it be in a shallow filter or a deeper one. Possibly, in the shallow filter, a somewhat smaller quantity of filtering material would suffice, so that the area required would not be quite double that necessary with the deeper filter; but as we have not taken into account the extra cost of construction due to the larger area covered, the comparison seems to be a fair one.

(7) The cost of removing a few barrow-loads of screenings and disposing of them may seem small, but if it is capitalised, it will make a respectable total.

It is not fair to say, "under the Exeter system grit chambers are necessary," for where there is no grit, no grit chambers will be needed, and where large quantities of road detritus are swept down the sewers, they will be required, whether the Exeter or Sutton system be adopted. We trust we are not taking too much license in stating our belief that it is not desirable to fill up the interstices of a coarse-grain filter with road grit and mud. Nor do we see how Mr. Smith can justify his statement that "the cost of removal and disposal of the insoluble deposit in the grit chamber and the tank will . . . counterbalance the cost of screening, &c., in the Sutton system." Granting that the insoluble deposit in the tank will increase to such an extent as to require removal, it is obvious that a like amount of insoluble deposit in the interstices of a coarse-grain filter would render it absolutely useless. The removal of such deposit from a tank or a grit chamber is neither a difficult nor expensive matter; to remove it from the interstices of a filter would probably cost as much as a complete renewal of the filtering material.

In very small works the tanks are not in duplicate, as in such cases it will not be necessary to stop the flow into the tank.

(8) It was not necessary to state that the fine-grain filters at Exeter require an occasional raking

over, for the simple reason that this is common to both systems. The filters constructed of clinker only need this attention at intervals of several weeks.

In his 10th clause Mr. Smith says that "the Exeter system cannot be adopted under the existing rules of the Local Government Board unless land is also provided." (This, of course, applies equally to the Sutton system.) "This will require that a man be in attendance to cultivate it even in small works." Surely Mr. Smith does not mean that the small area of land necessary in such a case would need a man constantly in attendance.

In the cases in which the "attendance to the filters can be reduced to half . . . an hour or so per day," we presume that their working is not regulated with the same nicety which Mr. Smith would require in a larger installation. Be this as it may, our system would, even in such a case, effect a saving in labour alone sufficient to pay our royalty.

It is rather late in the day to say as in (9) that "time alone will prove whether the cost of this (our alternating gear) will be compensated by the assumed saving in labour and regularity of working;" and again, "it has yet to be discovered that artificial filters can be treated as automatic machines." These points have been fairly well established by the various chemists who have examined the working of the Exeter installation, and whose opinions are entitled to some respect at Mr. Smith's hands.

It is quite true that sewage varies in character from hour to hour during the day, and we are quite prepared to learn that Mr. Smith instructs the men employed on the night shift to make the period of contact shorter than during the day. But with our alternating gear there is no need for any one to be at the works at night. If it were necessary to vary the time of contact, the change in the alternating gear necessary to secure such variation could be made in a few minutes; but with the Septic tank no such change is necessary, because, in spite of the variation in the character of the sewage during the day, the effluent from the tank is approximately constant in character from hour to hour. The shortening of the cycle and consequent increase in the rate at which the filters work, is not due to the alternating gear, as Mr. Smith suggests, but to the variation in the flow. Whether alternating gear is used or not, the filters will have to work faster when they have a large flow to deal with. Here also the Exeter system has a marked advantage over that at Sutton, inasmuch as the Septic tank affords a means of storing the excess at the time of maximum flow, so as to give the filters the benefit of a uniform flow throughout the twenty-four hours. In the new works at Exeter this is provided for.

Mr. Smith has "one other objection" to urge against our alternating gear, namely, "that the discharge valve is opened its full diameter at the commencement, when the filtrate is liberated with a rush, carrying with it the fine material and fouling the filtrate." It is important to note that nearly all the samples taken for analysis at our works and reported on at the inquiry were taken during this rush. These samples, taken under all the disadvantages described by Mr. Smith, were decidedly better than those from an ordinary sewage farm, and fit to be discharged into any running stream. But if Mr. Smith requires an alternating gear which shall retain the effluent in the filter for any specified time, and which shall open the discharge valve slightly at the commencement, and gradually increase the opening as the discharge goes on, we need hardly say we shall be happy to supply him with such a gear.

We fully admit Mr. Smith's claim as to the superiority of the Sutton process over any of its predecessors, our own system excepted; and it is with no wish to disparage that process that we state as the result of careful examination that in every case which has come to our notice our own will be found the less costly.—Yours faithfully,

CAMERON, COMMIN, AND MARTIN.

7 and 8, Bedford-circus, Exeter,
16th March.

COST OF BACTERIA SYSTEMS.

SIR,—It is evident from Mr. C. Chambers Smith's letter, which appeared in THE SANITARY RECORD of the 11th inst., that the Dibdin process is more economical than the Septic system, and Medical Officers and Engineers should feel indebted to Mr. Smith for pointing out the danger likely to arise from the use of the Septic alternating gear. Mr. Smith points out that there is no royalty charge of 30 per cent. upon the cost of works when the Dibdin system is used; yet the *Leeds Mercury* of the 3rd ult. stated that the Leeds Council had paid Mr. Dibdin a little over £900 in fees for advice respecting the experimental installation for treating about 100,000 gallons per day, and that in future Mr. Dibdin was only to be paid 20 guineas a day when engaged at the sewage works, and 3 guineas for each analysis. Although these fees may appear high, they are probably considerably less than the Septic Company royalty charges would amount to; but it would be interesting if Messrs. Cameron could show whether their royalty charges on the Septic system are likely to be less than Mr. Dibdin's fees for advice.—Yours faithfully, SEWAGE ENGINEER.

SEWAGE PURIFICATION.

SIR,—This interesting problem is now so well ventilated that its solution seems to me in the near future, and particularly so as a Royal Commission is about to take the matter in hand.

Sewage farming has proved that in cases where the conditions are favourable sewage can be efficiently treated, and an effluent produced which gives general satisfaction, but unfortunately, for reasons quite independent of the principle, this system can never have a general application.

Chemical treatment, on the other hand, can be applied in every case, and if properly and scientifically carried out no system can cope with it as to results obtained. The only bugbear is the sludge, but I hope to prove very shortly that sludge can be made a marketable article, and be sold at a price in any case sufficient to cover all the working expenses of the sewage treatment.

The bacterial treatment of sewage has recently come to the front, and it could not be otherwise, patronised as it is by such an eminent authority as Mr. W. J. Dibdin. It is doubtful, however, whether it is not a violation of Nature's laws to allow such a rich and valuable material to be eaten up by

bacteria, instead of utilising it for enriching the soil, as it evidently was intended.

On the other hand, notwithstanding the extended trials at Barking, Sutton, Exeter, Yeovil, Leeds, Blackburn, and other places, no definite figures are forthcoming as to the cost. On this side, if an engineer proposes a scheme he stakes not only his reputation but also his purse. You will see then that it is necessary to have figures on which we can rely with confidence.

A scheme for sewage farming as well as for chemical treatment can be prepared now-a-days with sufficient accuracy, but such is not yet the case with the bacterial treatment. Even eminent chemists disagree as to the results obtained. Taking Exeter experiments as an example, we have a variation of from 11·2 free ammonia (Rideal) in November to 2·2 (Dibdin and Thudichum) in June. This result goes to prove that in the winter months, in order to obtain the same result as in summer, five times more filtering surface must be employed, and it would appear that no one has yet attempted the application of a principle which forms one of the claims in my patent to balance the work of the bacteria all the year round.

When a bacteriologist takes a sample of water or sewage for examination, he is careful to place it in a box filled with ice, to prevent the development of the bacteria, and he is certain that although the bacteria have an abundant supply of oxygen, still they remain torpid on account of the low temperature. When he arrives at his laboratory he inoculates his getitine or bouillon, as the case may be, with the water or sewage, and places his sample carefully in glass cases and in a specially heated chamber, which he keeps at a constant temperature of from 70 deg. to 75 deg. Fah. The bacteria, which were torpid at a low temperature, now begin to develope in the heated chamber, and in a very short time they become so numerous that it is impossible to count them. This laboratory experiment corresponds absolutely with the practical results obtained on a large scale at Exeter; that is to say, in summer the work of the bacteria is at least five times more than in winter.

In my patent I laid great stress on aëration, *but with heated air* to bring up the temperature of the bacterial filters to 70 deg. Fah., the temperature most suitable for the rapid development of bacterial life. All my experiments go to show that heat is as necessary as oxygen to enable the bacteria to complete their destruction of the organic matters.

The heat necessary can be obtained from the waste gases of the destructors or steam boilers, and even if it was necessary to erect a small furnace to heat the air, the expense is nothing compared to the results obtained, as it means an enormous reduction of the filtering area, and the bacteria are placed in a medium enabling them to produce the greatest amount of work in the shortest space of time, whether in summer or winter.—Yours faithfully,

ANDREW HOWATSON.

88, Avenue de Neuilly,
Neuilly-sur-Seine, près Paris,
March 16th.

NOTICE TO CORRESPONDENTS.

OWING to a pressure of space several letters are unavoidably held over.

Notes and Queries.

Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C 1

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

1001.—HOUSE DRAINAGE: DRAIN OR SEWER.—"Dispute" writes:—(1) "In a block of back-to-back houses a rain-water pipe has been broken, and the rain-water runs in the foundations of Nos. 8 and 10, the houses belonging to two different owners. The pipe is fixed on the party wall, and runs through the houses from one side to the other. The owner of No. 8 says that the owner of No. 10 should repair the pipe, and No. 10 says it should be repaired at the joint cost of the two owners. To whom should I give notice to abate the nuisance? (2) A street gully which is fixed in the street and used for house drainage, and situate midway between the doors of two houses, is blocked up. Who should open the gully, the tenant or the owner? If the latter, which owner is responsible? Are these drains or sewers? The block was formerly owned by one owner, but now belongs to four owners. I may add that the common drains were laid by the Local Board about twenty years ago at the cost of the owners."

Answer. — (1) Inasmuch as the rain-water pipe is jointly used for the roof drainage of houses belonging to two different owners, its repair and maintenance should be borne jointly by the two owners, and a notice should be served on both under Sec. 94 of the Act of 1875. (2) The abatement of the nuisance will devolve upon the occupiers who jointly use the gully, and notice should be served on each under Sec. 94, or it may be served on one person only as provided by Sec. 255. Owners are liable for nuisances arising from the want or defective construction of structural conveniences, and tenants, generally speaking, are liable for nuisances caused by the improper use or misuse of such conveniences and for neglect to cleanse drains, cesspools, ash-pits, and the like. A gully used for receiving slop-water is not a sewer. The common drain will, we think, be a sewer, although if it be used for draining two or more houses within the same curtilage it may, nevertheless, be a drain. Decisions on the subject are very conflicting.

1002.—INSPECTORS OF FACTORIES: QUALIFICATIONS, &c.—"H." writes:—"Where can I find full information as to the requisite qualification and method of appointment of H.M. Inspectors of Factories, and the usual procedure in making application for the post?"

Answer.—We answered a similar Query, No. 994 in our issue of March 18th, to which our correspondent should refer.

1003. — WATER: TESTS FOR IMPURITIES IN.—"F. D." writes:—"I am instructed by my Council to take samples of drinking water in my district, which is obtained from rain-water tanks and wells, but as these are not for analysis I cannot see the use of taking them, and I should esteem it a favour if you could inform me of any simple chemical tests which would serve to show whether the water was contaminated or not by soakage from cesspools or other sources of pollution, which I could apply myself, when, if I found anything suspicious, I could then take a sample and submit it to a professional analyst."

Answer.—A simple test which can be recommended is Dr. Lowe's, described as a "Ready Test for Sewage Impurities in Water." To use the test one of the glass balls is dropped from a height of a foot into a clean wine glass the latter to be thereupon filled with the water to

be tested. The more dangerous kinds of impurity (ammoniacal products derived from sewage) if present in considerable amount are at once detected by the production of a yellow colour, or by a flocculent deposit which becomes yellow or greenish after standing six hours. Water of this description is unfit for use. If a cloudiness or white precipitate is formed, the water should not be used without previous boiling, and it should be submitted to a professional analyst. The tests are supplied at 2s. 6d. per dozen by Messrs. Negretti and Zambra, 38, Holborn Viaduct, London, E.C. Ready tests for ascertaining impurities in water are also supplied by the London and General Water Purifying Company, Ltd., 157, Strand, W.C. The company publish a pamphlet entitled "Water: Its Impurities and Purification," price 6d., wherefrom particulars and prices of the tests may be obtained. None of these tests must, however, be considered to supplant the requirements of analysis by a skilled analyst, but may be used for determining roughly the presence of impurities.

1004.—MEMBER OF DISTRICT COUNCIL INTERESTED IN CONTRACT: DISQUALIFICATION.—"C. C." writes:—"In your reply to Query 992, on above subject, have you not overlooked Sub-section 2 of Sec. 46 of the Local Government Act, 1894, which provides for a Councillor entering into a contract with the Council? At least, I understood it so."

Answer.—We are much obliged to our correspondent. The provision that a person shall not be disqualified for being a member or chairman of any Council when interested in a contract, extends only to the Councillor being interested in the sale or lease of any lands, or in any loan of money to the Council or Board, or in any contract with the Council for the supply from land of which he is owner or occupier of stone gravel or other materials for making or repairing highways or bridges, or in the transport of materials for the repair of roads or bridges in his own immediate neighbourhood. This exception, however, was not overlooked by us and does not apply to the case put before us in Query 992. The intention of the Legislature in framing this section was to avoid penalising members in rural districts, such as farmers who may possess gravel-pits or stone quarries, who might supply such materials where such could not otherwise be procurable except at considerably increased cost to the Highway Authorities for the repair of roads; and also to enable such Councillors to supply team labour for a similar reason. But in each instance, the supply of materials or team labour must be in the immediate neighbourhood of the residence or holding of the Councillor.

1005.—BUILDING BYE-LAWS: PLANS APPROVED BEFORE NEW BYE-LAWS WERE CONFIRMED.—"M. S." writes:—"Will you please inform me whether the last clause in the Building Bye-laws sent herewith, which repeals former bye-laws, exempts buildings the plans for which were passed but work not commenced before the new bye-laws came into force? What construction would you place on the word 'work' in the repeal clause?"

Answer.—Where plans for new buildings, have been approved by the Sanitary Authority under the old bye-laws and notwithstanding that the work is not yet commenced, such buildings will be exempt from the operation of the new bye-laws. The word "work" in the clause referred to must be read with the sentence immediately following, which, we think, our correspondent appears to have overlooked. The clause is as follows:—"The bye-laws . . . confirmed on . . . shall be repealed except as regards any work commenced before the date of confirmation of this bye-law or any work not so commenced but of which plans shall either have been approved by the Sanitary Authority before such date or have been sent to the surveyor or clerk to the Sanitary Authority one month at least before such date, and shall not have been disapproved by the Sanitary Authority."

1006.—HOUSE DRAINAGE: WATER TEST.—"S. P. K." writes:—"In applying the water test to a drain would it be right to fill, say, a 4in. drain 80ft. long, with a fall of 1 in 40 from plug to highest gully, which would give a head of 2ft? Would the pipes be fractured if even a greater head were given? I was told by a surveyor the other day, the pipes would be fractured, and he also said the water test was not a good one, because the lower pipes had to stand the most pressure."

Answer.—The hydraulic or water test for applying to new house drains is the best and most reliable test at present known to engineers, and is enforced by all Local Authorities of repute before the drains are covered in. It is incorrect to state that ordinary drain pipes would be fractured under an internal pressure of 2ft. head, or ·864 lb. per square inch. Many fire-clay pipes will withstand a pressure when one-twelfth of an inch thick, of 160lb. to the square inch, or a head of 69·28ft. Drains constructed of sanitary pipes and jointed with cement should be able to bear a pressure of at least 4ft. to 5ft. head of water without damage to the joint, if the latter is properly made. When it is required to apply the test to a considerable length of drain, square junctions should be laid at every rise of 4ft. for the introduction of the testing plug, so that each section of the drain may be tested separately.

1007.—OPENINGS IN PUBLIC HIGHWAYS: REPAIR OF SURFACE.—"M. S." writes:—"What is the custom with regard to builders and owners of property opening the surface of streets to connect drains to sewers or for repairs? Is there any statutory power to compel such persons to keep the surface of the roadway over such

MISCELLANEOUS PUBLICATIONS.

The Municipal and Sanitary Engineer's Handbook. H. P. Boulnois, M. Inst. C.E. 15s.

Sanitary Engineer's Pocket Report Book. E. A. Sandford Fawcett, C.E. 4s.

A Healthy Home. Francis Vacher. 2s. 6d. net.

Healthy Households. G. C. Rothery. Post free. 1s. net.

Hospital Construction. Sir Douglas Galton. Illustrated. 10s. 6d.

Water Analysis. J. A. Wanklyn. 5s.

A Handbook on Tuberculosis among Cattle. Henry L. Shumway. 3s. 6d. net.

Carriage Ways and Pavements. H. P. Boulnois. 5s.

Healthy Dwellings. D. Galton. 10s. 6d.

Metrical Tables for Engineers, Surveyors, Chemists, Merchants, &c. By Frederic Elie Gay, Assistant City Engineer, Bath. 2s. net.

Infectious Diseases Louis C. Parkes. 2s. 6d. net.

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Clerk of Works. A Vade Mecum for all engaged in the Superintendence of Building Operations. G. C. Hoskins, F.R.I.B.A. 1s. 6d.

Practical Building Construction. A Handbook for Students Preparing for Examinations. I. P. Allen, Durham College of Science. Illustrated. 12s. 6d.

Steam Laundries and Public Health Sanitary Record. 6d.

Dangerous Infectious Diseases. Francis Vacher, M.D. 1s. 6d.

Molière and his Medical Associations. A. M. Brown, M.D. 6s.

THE SANITARY PUBLISHING COMPANY, 5, Fetter Lane, London, E.C.

drain good for a reasonable time, say six months, until all settlement has ceased? I enclose copy of form of consent given by this Urban Authority to open the road."

Answer.—It is the practice with very many Urban Authorities not to permit private individuals to open the surface of public highways for the laying or repairing of drains. In such cases the Authority undertake the necessary work but the owner or occupier of the premises is required to pay the estimated cost of the work in advance to the Authority. When this practice is not carried out the Urban Authority are enabled, under Sec. 149 of the Public Health Act, 1875, or under Local Acts in the case of boroughs, to withhold or give consent for the opening of the surface of the road on such conditions as they deem fit. The Authority may, in our opinion, reasonably require the surface of the trench to be maintained for a period of six months. The provisions of Sec. 149 referred to, as to wilfully taking up or displacing, or injuring the pavement, stones, materials, &c., of a public street in an urban district under penalties, should not be overlooked. In the case named by our correspondent, consent is given subject to the owner reimbursing the cost of any work which the Authority may have to bear in subsequently making good the surface of the street.

1008.—BUILDING BYE-LAWS: CONTRAVENTION OF.—"Surveyor" writes:—"A person deposited plans with my Authority for building a pair of shops, which the Committee passed, subject to their being carried out in accordance with the bye-laws. B, a local builder, is erecting them, and is contravening Bye-law 31 by placing timber in the party walls, and not leaving the 4½in. as stated by Bye-law 32. Moreover, the templates supporting the bressumers over the shop windows are of wood, which is not in accordance with Bye-law 33. These, I know, can be enforced. But the bressumer over the window is not strong enough, and is sagging in the centre about 1½in., although the work is only half-way towards completion. I have written the builder, saying he must put in stronger timbers, or strengthen the existing bressumer by fixing an iron column under it, or by any other approved method. Can I enforce this, and, if so, under what clause? In case of a prosecution, should proceedings be taken against the builder who is carrying out the work, or the owner who deposited the plans?"

Answer.—The builder may be required, under Bye-law 33, to provide additional support to the bressumer. The second paragraph of this bye-law provides that the person erecting a new building shall also, if necessary, cause such bressumer to have such other storey-posts, iron columns, stanchions, or piers of brick or stone on a solid foundation under the same, as may be sufficient to carry the superstructure. If the builder fails to comply with the requirement of the Local Authority who have called upon him, after being satisfied of the insufficiency of support to the said bressumer, they may take proceedings against him for a contravention of Bye-law 33. The Local Authority should be prepared with evidence to prove the insufficiency of the bressumer and the strength of same for resisting the pressure of the weight of wall above it. Proceedings should be taken against the builder, who is the person erecting the building, as provided by the bye-law.

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CLERK OF WORKS (HAM, SURREY, April 4th).—For the Urban District Council. Salary £3 3s. a week. Mr. W. Warner, Kingston-road, Ham.

CLERK OF WORKS (WOLVERHAMPTON, March 28th).—Wages, £3 per week. Mr. J. W. Bradley, C.E., borough engineer and surveyor, Town Hall, Wolverhampton.

CLERK OF WORKS (NEATH, March 28th).—For the Neath School Board. Salary £2 2s. per week. Mr. J. Cook Rees, architect, Neath.

ENGINEER AND MANAGER (HINCKLEY, March 21st).—For the Urban District Council. Salary not to exceed £250 per annum, with house, coal, and gas. Mr. J. W. Preston, clerk, Hinckley.

ENGINEERING ASSISTANT (WEST HARTLEPOOL, March 29th). Salary, £2 per week. Chairman of the Works Committee, Borough Engineer's Office.

ROAD SURVEYOR (SUNDERLAND, March 31st).—For the Corporation. Salary £130 per annum. Mr. Fras. M. Bowey, town clerk, Town Hall, Sunderland.

SANITARY INSPECTOR (LONDON, W., March 28th).—For the Vestry of St. Mary Abbotts, Kensington. Salary £110 per annum, rising by conditional and annual increments of £10 to £160. Application forms, to be obtained at the Town Hall, Kensington High-street, must be delivered at the office of Mr. Wm. Chambers Leete, vestry clerk, Town Hall, Kensington High-street, W.

SEWAGE FARM MANAGER (LEEDS, April 6th).—City Engineer, Leeds.

SURVEYOR, &c. (KINGSWOOD, April 7th).—For the Urban District Council. Salaries £85 and £50 respectively. Mr. Percy Baldwin, clerk, Council Offices, Kingswood.

SURVEYOR'S ASSISTANT (CAERPHILLY, March 29th).—For the Urban District Council. Salary £2 a week. Clerk to the Council, Council Offices.

Contracts Open.

The dates given below are the latest up to which tenders can be received.

BEVERLEY.—March 28th.—Clough Doors, &c.—Mr. W. Evans, surveyor, New-walk, Beverley.

HEBBURN.—March 28th.—Sewer.—Mr. J. B. Renton, Argyle-street, Hebburn.

LONDON, W.—March 29th.—Sanitary Alterations.—Mr. T. Hensman Munsey, vestry clerk, Vestry Hall, Piccadilly, W.

RUNCORN.—March 29th.—Sewering.—The Surveyor's Office, Town Hall.

IPSWICH.—March 29th.—Electric Lighting, &c.—Mr. A. G. Vulliamy, clerk, 6, Tower-street, Ipswich.

STANLEY (DURHAM).—March 30th.—Scavenging.—Mr. Joseph Routledge, surveyor, Council Offices, Stanley.

BATH—April 2nd.—Reservoir, &c.—Mr. E. H. Sheppard, surveyor, 3, North-parade, Bath.

BUXTON.—April 2nd.—Heating.—Mr. S. Selby, 21, High-street, Buxton.

CONGLETON (CHESHIRE).—April 2nd—14th.—Water-supply Works.—Mr. C. Russell Hall, West-street, Congleton.

BATTLE (SUSSEX).—April 4th—Drain.—Mr. Henry Card, county surveyor, County Hall, Lewes.

GLASTONBURY.—April 4th.—Sewer, &c.—The Borough Surveyor, Council Offices, Glastonbury.

PUDSEY.—April 4th.—Sewers.—Mr. J. Jones, surveyor, Council Offices, Pudsey.

EPPING (ESSEX).—April 5th.—Sewers, &c.—Mr. Edmond Egan, A.R.I.B.A., engineer to the Council, Holmdale, Loughton, Essex.

COMPETITIONS.

CRICKLADE (WILTS), April 30th.—Water Supply Plans.—The Cricklade and Wootton Bassett Rural District Council invite engineers to forward a report, with plans and estimates, for furnishing an effective system of water supply to the town of Cricklade, Wilts, exclusive of the cost of the land or easements, but inclusive of all other expenses. Premiums of £21 and £10 10s. will be given for the plans which the Council shall adjudge to be first and second in order of merit. Mr. Harry Bevir, clerk, Union Offices, Wootton Bassett.

WINCHESTER, March 31st.—Public Baths. Extension of Time.—The time for submitting plans for the public baths competition is extended to March 31st. Premiums of £25 and £15 will be awarded for the designs adjudged by the Council of sufficient merit, and placed first and second in order respectively. The premiated plans will become the property of the Corporation. Drawings and detailed estimate to be deposited at the office of Mr. Walter Bailey, town clerk, Guildhall, Winchester, marked "Swimming Baths," on or before March 31st, instead of 28th inst., as previously mentioned.

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For literature see "THE THERAPIST," November, 1897, and January, 1898.

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ARTICLE NO. 1.

IGNORANT STATEMENTS REFUTED.

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The introduction of a combination which possesses several advantages over ordinary Cocoa has met with such unparalleled success, that it has evidently aroused the jealousy of other Cocoa manufacturers.

The use of malt and hops in the form of beer is almost a characteristic of the British people, but the rapid spread of temperance principles has deprived many people of the use of these two valuable products in the form of a beverage.

It is difficult to make liquid preparations of malt and hops that will keep, without the use of alcohol or some other equally objectionable preservative Consequently the idea of combining them in a solid form with Cocoa, so that on the addition of water or milk they would form a beverage, containing the properties and possessing the advantages of all three, has naturally met with the success it deserves.

Kola is not so widely known as malt and hops, hence possibly the ignorant and erroneous statements that have been circulated by a badly informed writer, who does not sign his name, in an almost unknown medical journal, but which we regret to find have been quoted by a well-known firm of Cocoa manufacturers, as if the statements were true.

Kola has been carefully analysed by English and French chemists of the highest reputation. In any modern work on the chemistry of vegetable substances the information may be found that Kola contains the same active principle as Cocoa itself, viz., theobromine, as well as caffeine, the active principle that occurs in tea and coffee.

In most tropical and sub-tropical countries some plant or other containing these active principles has instinctively been chosen by the natives as a national beverage. The use of coffee, extending originally from Abyssinia and Arabia, has become more or less general over the civilised globe as a brain stimulant. The use of tea, originating in China and Japan, has also spread over the world, more especially in English-speaking countries and English colonies, more perhaps as a restorative and aid to muscular exertion than as a brain stimulant.

In the Argentine Republic and southern parts of South America millions of pounds of Paraguay tea, prepared from a kind of holly, are used similarly for making tea, and in northern parts of South America, especially in the districts of the Amazon, Guanana is employed for the same purpose. Throughout Western Africa, extending southward to the Angola and eastwards to the Soudan, Kola nut has been described by the earliest travellers, and up to the most recent date, as used by the negroes for the same purpose as tea. Indeed, the seeds have been carried by them in past times and planted in the West Indies and other countries where the negroes were taken as slaves.

All these substances contain caffeine as the active principle, but each differs in the presence of small quantities of other constituents, which cause the well-known difference in the effects of tea, coffee, and Paraguay tea. Tea is apt to cause indigestion and nervousness in some people, coffee is liable to produce constipation in others ; but Kola, whilst it has not the aroma of coffee or the fragrance of fine tea, is without the disadvantages of either, and, therefore, by its addition to Cocoa, gives to that beverage the advantage of caffeine as a restorative and stimulant without the disadvantages of either.

In proof of this statement, we may quote from a paper on Kola, by Dr. Daniell, who was for some time a resident in West Africa, and who says in the *Pharmaceutical Journal* (1865, Second Series, vol. vi., p. 450) : "One remarkable feature worthy of attention is the marked avidity displayed by the negro inhabitants of Sierra Leone and Portuguese colonies for the nuts in preference to the beverage of tea and coffee, although these contain the same alkaloid."

The Kola tree is nearly allied to the Cocoa tree, for both belong to the same family of plants, and contains the same active principle, but in smaller quantity, with the addition of as much caffeine as is found in good tea and coffee.

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Candidates must have had a thoroughly practical experience in works of sewerage, drainage, and sanitary plumbing, and must hold the certificate of the Sanitary Institute.

The person appointed will be required to devote his whole time to the duties of the office, and may, in addition to the foregoing duties, be required to discharge those of an Inspector of Nuisances.

Personal canvassing for the appointment will be a disqualification.

Applications, in the handwriting of the candidates, stating age, residence, past and present occupation, accompanied by copies of not more than six testimonials of recent date, must be delivered to me on or before Thursday, the 31st March instant, endorsed, "Inspector of House Drains, &c."

By order,
FRAS. M. BOWEY,
Town Clerk.

Town Hall, Sunderland,
14th March, 1898.

COUNTY BOROUGH of SUNDERLAND.

INSPECTOR OF SEWERS.

WANTED, by the Corporation of Sunderland, an INSPECTOR of SEWERS.

Salary £140 per annum, increasing by £10 yearly until £180 per annum be reached.

Duties will include the supervision of the laying of all new sewers, and the relaying, repair, inspection, cleansing, and flushing of all existing sewers, &c.

Candidates must have had a thoroughly practical experience in works of sewerage and drainage.

The person appointed will be required to devote the whole of his time to the duties of the office.

Personal canvassing for the appointment will be a disqualification.

Applications, in the handwriting of the candidates, stating age, residence, past and present occupation, accompanied by copies of not more than six testimonials of recent date, must be delivered to me on before Thursday, the 31st March instant, endorsed, "Inspector of Sewers."

By order,
FRAS. M. BOWEY,
Town Clerk.

Town Hall, Sunderland,
14th March, 1898.

NOTES AND ILLUSTRATIONS
OF
The Essentials of House Sanitation.
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NOTICE.—The Annual Subscription to this Journal has been raised to 12s. 6d. to all NEW Subscribers. NO ADVANCE will be made to our friends whose names were entered on our Subscription list prior to March 31st, so long as they continue to subscribe.

THE

Sanitary Record,

APRIL 1, 1898.

Notes.

Sanitarians at Dinner.

SELDOM has there been a more representative gathering of men eminent in sanitary science than that which was assembled in the Holborn Restaurant last week to celebrate the twenty-second anniversary of the Sanitary Institute. As we glance over the short list of names at the head of the report given in our pages, there is not one but what has made some mark in the army of Public Health workers; and those present

from kindred organisations demonstrated the high value placed upon the work of the Institute. One remarkable feature, however, permeated the whole proceedings. All the speakers were able to refer to the many ways in which progress had been recorded in sanitary science; but there was a consensus of opinion that greater things were yet to be accomplished. Unquestionably we are on the eve of great discoveries, and Lord Egerton of Tatton showed how keen is the interest taken in the problem of sewage disposal. Truly, never was a Royal Commission appointed to inquire into a matter more vital to the public good, and we are convinced that when it closes its labours it will recommend the superseding of old methods by newer, better, and more economical means. The Sanitary Institute may well be proud of its work, for it is, as Sir Douglas Galton said, owing to its "single-minded desire to convey to the nation a due appreciation of the value of sanitation" that the old order will shortly give place to the new.

The Motor Car as a Refuse Collector.

In many ways the existence of the motor car appears to be a perilous one. The "financial difficulties" through which it has to drive before it can reach the public streets are simply enormous, and similar ones have in times past strangled many a "good thing." But there is one branch of local administration in which it appears likely to find favour, and that is as a collector of dust and refuse. It has received a fair trial at Chiswick, and the reports given of its efficiency are of a most satisfactory character. Other metropolitan districts are, we learn, likely to give it a trial. For instance, the Surveyor of Chelsea, Mr. T. W. E. Higgins, Assoc. M.I.C.E., has, in the course of a special report to the Vestry, made an interesting comparison of the cost of the two methods—horse and cart *v.* motor van. He estimates the capital expenditure on the latter would be £320. To work this would require a driver and two dustmen, and their wages and necessary fuel and water would cost £6 5s. per week, or £325 per annum, or with depreciation a charge of £357 10s. Two horses and vans he puts down at £240. Working expenses are estimated at £6 18s. per week, or £358 16s. per year, or with depreciation £370 16s. The difference between the two may not appear great, but it is more than sufficient to pay interest on the extra money needed for capital expenditure on the motor van. It will be interesting to see if these figures prove correct, but we are of the opinion that 5 per cent. is not sufficient allowance for wear and tear of horses and carts. Experience demonstrates, we think, that 10 per cent. is the least that should be reckoned for such a purpose.

Statistics.

We hear much about the pollution of streams running through Lancashire, yet there are few people who realise the magnitude of the causes working to this end. An interesting report on the subject has just been issued by Mr. R. A. Tatton, Chief Inspector to the Mersey and Irwell Joint Committee. In this we are told that in the area of Mersey and Irwell watersheds there are seven county and eleven non-county boroughs, with a population of 2,474,000 and a rateable value of nearly £6,200,000. To this must be added sixty-two Urban and ten Rural District Councils, with a population of 761,933 and rateable value of £3,542,344. On the rivers Irwell, Roach, Irk, Medlock, and Mersey, there are no less than 410 manufacturing works. The trade refuse from these concerns must be enormous; yet, thanks to the watchfulness of the Joint Committee officials, "the improvement reported in 1896 has been maintained, and the bed of the river in its upper reaches is practically free from cinders." With regard to pollution by liquid sewage, the following particulars are of interest:—"In 1892 there were 74 Urban Authorities; now there are 80. . . . Of the 74, only 27 had works in operation in 1892. In January of this year there were 61 such Authorities with works in operation." Besides these, sixteen have works in progress, leaving only three unprovided for. The report also deals with the new sewerage proposals for Manchester and Salford.

A Record!

There are many people who think that some of our Governmental Departments still maintain a reputation for circumlocution and want of punctuality in their dealings with local affairs, but we venture to think the "record" for delay is at present held by France. Early in March the inhabitants of Paris were surprised and amused one morning at an announcement placarded throughout the city. It ran somewhat like this: "The public are informed that in execution of a Royal Ordinance passed on August 23rd, 1835, an inquiry is about to be opened as to the propriety of constructing at Clarenton a new reservoir." This opens up a nice little problem. If it takes sixty-three years after the proclamation of a Royal Ordinance to arrive at a decision to "hold an inquiry," how long will be wanted to consider any report the Commission may make? Then, granting the report is favourable, what period will be required for the construction of the reservoir? Will the twentieth century witness its accomplishment? After all, in some things, at any rate, we "do better in England."

A Good Word for English Public Life.

Just now there is a desire on the part of many of our neighbours to speak unkindly of the Britisher and all his ways. It is refreshing, therefore, to have one word of praise from across the Atlantic, and more particularly as it refers to the conduct of our local administrators. Commenting on the recent London County Council election, the *Nation* (New York) has the following significant words:—"Strange as it may appear to us, the question of the honesty or competency of the employés of the Corporation has not once been raised during the canvass. It has not been charged that any one was unfit for his place, or got it through favour or corruption, or through being the favourite of an old pugilist in Whitechapel or Southwark. No one seems to expect to get a place through the election. There is no 'slate,' no 'dead beat,' or saloon-keeper talking of getting his dues at last out of the public, or of being able to lay up something for his old age. The discussion seems to have turned entirely on public questions." It is regrettable to think that when we reverse the above, a picture is presented

of what local politics sometimes are in the States. We hope, however, the lesson of London will not be lost, and that very soon the papers of our sister land may be able to say the same of the administrative life of their own cities and towns.

The Plague in India.

It is singular to think how indifferent people at home are to the really terrible state of things that at present exists in Bombay; but that they are indifferent is, we fear, beyond a doubt. A brief telegram or two—sometimes only once a week—and an occasional question in Parliament, practically sum up all that is to be seen in the daily Press on this momentous subject. If a few lives should be lost in a riot, we indeed suffer from no lack of news; but of the hundreds of lives that are mowed down every day by the fell disease, and of the untold suffering of which the great city is full, how much does the public of Great Britain hear—and how much does it care? And yet things are growing steadily worse. The official returns for last week report 1259 deaths from plague during the week, including four Europeans; the deaths from all causes numbered 2268, and the death-rate was 142·25 per 1000. The spread of the epidemic among Europeans gives us cause for grave anxiety. We observe, too, that the popular unrest, though outwardly suppressed, is as strong as ever.

The Small-pox at Middlesbrough.

It is somewhat disheartening, in view of the cheerfully optimistic tone that has for some time been held by the authorities at Middlesbrough, to observe in the daily reports of the small-pox epidemic how the loathsome disease continues to maintain its ground, in spite of the admirable sanitary arrangements that now prevail. On the 19th ult. seventeen cases were notified, on the 22nd there were nineteen, on the 24th there were twenty-five, and on the 25th there were seventeen, and, with very few exceptions, these were almost all from new centres; so that the end of the week does not find us much further forward than we were at the beginning. Altogether the number of cases since the commencement of the outbreak is now running well up to 1200. Several deaths occurred in hospital during the week, but, on the other hand, a large number of patients were discharged as cured, and a yet larger number are reported to be convalescent. There are still, however, about 400 cases in the wards.

Effects of the Epidemic.

We hear that the trade of the town is suffering terribly in consequence of the continued prevalence of the disease. A regrettable feature of the epidemic is the number of cases that has occurred among the men who have been employed in connection with the erection of the sanatorium. Another feature, that has its humorous aspect as well, arose in regard to the precautions taken in arranging a football match between Middlesbrough and Thornaby. The committee who had charge of the arrangements decided that the game should take place on a specially selected ground, with closed gates, and that only players who produced medical certificates as to their freedom from small-pox should be allowed to take part—so wisely careful were they that the infection should not be spread by a friendly game. Meanwhile the town authorities continue to exercise the utmost vigilance. One householder who has been detected in attempting to conceal a case of small-pox in his house is to be prosecuted. We trust that the hopeful view they take of the situation will soon be justified by a perceptible decline in the epidemic.

The Opposition to the New Vaccination Bill.

The Anti-Vaccinators are in a state of great indignation over the new Vaccination Bill. As we should expect, they insist that the only reform that will meet their views is the total repeal of the Vaccination Acts, and in particular they express their strong condemnation of the disregard by the Government of the Royal Commission's recommendation that conscientious objectors to vaccination should not be subjected to prosecution. These so-called "conscientious" objections, however, when closely examined, are beyond a doubt largely sentimental in character; and though some of them are undoubtedly based on real defects in the existing law, both classes of objections will be substantially obviated by the provisions of the new measure. The substitution of glycerinated calf lymph for human lymph, the extension of the age of compulsory vaccination, and the proviso whereby children may be vaccinated in future at their own homes, instead of at a public institution, all combine to remove the risks that may attend the present practice. They will, further, render it impossible for parents to attribute to vaccination those ailments which are incidental to infancy, or which have been contracted through hereditary transmission, or infection from other sources.

The Administration of the Act.

The Bill proposes no change in the Local Authority charged with carrying out the law. We may therefore expect that in many places, where anti-vaccination feeling is strong, it will continue to be made a test question of elections of Boards of Guardians, whether the Act, the administration of which is entrusted to them, is to be enforced or not; and it is possible that even the new Act will in some cases be allowed to remain a dead letter. This is to be regretted; but we trust that, with the great reforms that the measures will effect, a more enlightened opinion will prevail, until vaccination becomes practically universal. Some critics of the Bill have suggested that it would have been well had the Government adopted revaccination as part of their administrative duty towards the public. The time for this reform is probably not yet sufficiently mature, though we may look for it some day. There is no such educator of public opinion as an epidemic.

The Vaccination Bill and Scotland.

The Act is not to extend to Scotland or Ireland, but there is little doubt its influence will soon be there felt. The use of glycerinated lymph will probably become general before long, and when it is available human lymph will fall into disuse. The objections to repeated prosecutions, too, are not confined to England; so that, without express legislation on the subject, it is reasonable to expect

that Scotch and Irish practice will gradually assimilate itself in this respect to English law. As to the vaccination period, it was pointed out in the House of Commons last Friday that the maximum period in Scotland is at present six months; and if the period in England is to be extended to twelve months, Scotch members would naturally desire to obtain a similar extension for the northern half of the kingdom. The Lord Advocate, however, explained that there was really no need at present for fresh legislation for Scotland, because the power possessed by Medical Officers —if a child is not in a fit state for vaccination—to extend the period by means of a certificate for a period of two months, and thereafter, if necessary, to grant a still further extension of the period of exemption, obviates any feeling of hardship. The Scotch system on this point has always worked with perfect success.

Edinburgh and District Water Bill.

A SELECT Committee of the House of Lords, presided over by the Duke of Richmond and Gordon, have commenced consideration of a Bill for increasing the water supply of Edinburgh and district. The history of the Bill is curious, and we may have occasion to revert to it at another opportunity. In the meantime it is sufficient to state that it is the product partly of the great scarcity of water from which Edinburgh has suffered for some time past, and partly of a protracted litigation with the owners of certain mineral seams through which the city water pipes are carried. The straits to which Edinburgh has recently been reduced for obtaining an adequate water supply are not generally known. Sir Henry Littlejohn, the Medical Officer of Health, stated to the Committee that the position of affairs last summer was so serious that in the city hospital for contagious diseases, where there was then a large number of cases of scarlet fever, water could not be had to give the patients a bath. The situation was, indeed, perfectly scandalous; but the authorities kept it quiet, fearing that, if it were known, the reputation of the modern Athens would be seriously imperilled during the tourist season.

An Improvement Scheme for Edinburgh.

EDINBURGH has also been looking to further its sanitary reputation by the promotion of an improvement scheme having for its object the demolition of certain insanitary areas in the city in the districts of Stockbridge and Portobello. An inquiry ordered by the Secretary for Scotland under the Housing of the Working Classes Act has been held, at which it was stated that previous improvement schemes and various railway operations during recent years had considerably curtailed the supply of houses for the working classes; and, therefore, the Local Authority were quite prepared to recognise that the displacement of population necessitated by the present scheme might impose on them an obligation to provide new houses of a suitable kind. As for the need for this particular scheme, the evidence clearly showed that the properties proposed to be dealt with were not merely in a very dilapidated condition, but also overcrowded to a dangerous extent. In one area, of an acre in extent, there were 476 inhabitants, which was ten times more than the average rate over the city. Many of these houses were also most unsanitary, and some, which occupied very low levels and were near the shore, were liable to be flooded in high tides or after heavy rain—a state of things which pointed to the need for a permanent improvement.

Sewage Purification.

THERE is no subject at the present time in connection with municipal engineering which attracts more attention than that of sewage disposal and purification, which arises from the fact that many of the older systems—some of which were announced at the time of their introduction as affording a final solution of the difficulty of sewage treatment—have broken down in practice, and Local Authorities have been compelled by Rivers Boards or County Councils to take measures to ensure more efficient purification of the effluent from their sewage disposal works. Most of the patented processes have been unable to stand the test of many years' working; and treatment by land irrigation, so uniformly enforced by the Local Government Board, has also been found ineffectual in probably the majority of instances. The Report which is just published of the Rivers Committee of the Manchester Corporation—a sub-committee of which have been visiting numerous sewage works in the kingdom—is useful evidence at the present juncture of the failure of the old order of things, and of the transition which is taking place in the methods of purification of sewage. The deputation visited the Barking outfall works, Friern Barnet, Sutton (Surrey), Chorley, Oldham, Swinton, Salford, Glasgow and Accrington, and Church sewage disposal works, and it is interesting to note that at each of these places biological filters were found to have been constructed, and gave good and satisfactory results. The Committee observe that, "wherever they have visited the works of other Authorities in all cases the land is ineffective, and is in many cases to be superseded by artificial methods of filtration." The outcome of the labours of the Committee of the Manchester City Council is, that having considered the cost, capacity, and endurance of biological filters and bacteria beds, they recommend the construction of four acres of such bacteria beds, and that after completion of this area and proof of cost, capacity, and efficiency, the progressive extension of the same be made on an area large enough to meet the requirements of the daily normal flow of sewage. Such a conclusion, arrived at after most careful investigations by so important an Authority as Manchester, is likely to be copied by less important Local Authorities who have not the advantage of obtaining such information and advice as Manchester can afford. The report is a most valuable one, and we hope to be able to refer to it again later on.

TO OUR READERS.

The Editor solicits the co-operation of readers in making THE SANITARY RECORD *more attractive by means of pen-and-ink sketches, photographs, and diagrams. There are many phases of sanitary work which lend themselves admirably to illustration. By this means not only individual articles, but the journal as a whole will be heightened.*

NOTES ON PRACTICAL SANITARY SCIENCE.

By WILLIAM H. MAXWELL.

Assistant Engineer and Surveyor, Leyton Urban District Council, Author of "Drainage Work and Sanitary Fittings," "Ventilation Heating, and Lighting," &c., Certificates of the Association of Municipal and County Engineers, and Sanitary Institute.

No. 55.—REFUSE DESTRUCTORS.

(*Continued from page* 306.)

The Beaman and Deas Sludge Furnace.[137]

Messrs. Beaman and Deas have also a further patent furnace for burning sludge from sewage works, from manufacturers' settling tanks, and the slurry or slip produced in the manufacture of Portland cement and other similar materials. The construction of the furnace is illustrated in the accompanying Figures (22 and 23), in which

A = a reverberatory arch,
B = the fire-grate,
C = the inclined feeding hearth,
D = a hollow fire-bridge,
E = a perforated screen,
F = a secondary combustion chamber,
G = the ashpit, which is closed and provided with a forced draught through the air conduit H.

At the back of the secondary combustion chamber is an auxiliary chamber flue or passage I, communicating through flue J with the space K under the inclined feeding-hearth. In this space (K) a bridge L is erected for the purpose of deflecting the hot gases upon the under side of the feeding hearth, from whence they make an exit through a flue M to the chimney shaft.

The feeding-hearth consists of flanged angle bars arranged closely together and connected by bolts or rivets passing through the flanges.

Instead of allowing all the furnace gases to pass directly over the bridge D, some of them may be taken from a point over the inclined feeding hearth into a scondary combustion chamber through the hollow bridge, where they mingle with the incoming air, or the gases may be conveyed from the upper part of the inclined hearth direct to the secondary side of the furnace.

These furnaces may be built singly or in groups similar to ordinary destructor cells. The sludge or refuse material to be burnt is supplied to the upper part of the feeding hearth through a small opening (O) about 18in. square, which aperture is kept closed by the supply of refuse whilst the furnace is in use. The material thus supplied to the hearth is dried in the course of its downward passage to the grate, thus assisting its more rapid combustion. At P is a door through which the grate may be cleared and the clinkers removed. Dust is removed from the ashpit through door R, and from the flues and chambers below the furnace and hearth through S and T. Fresh air is supplied to the hollow bridge through the passages U. The products of combustion from the furnace, after passing the perforated screen, are caused to return through suitable flues to below the inclined feeding hearth, which becomes highly heated thereby.

Should there be no combustible matter in the sludge, &c., to be burnt, a sufficient quantity of breeze or other suitable combustible material is mixed with it.

The novel points claimed by the patentees for this type of furnace, in brief, are as follows:—

(1) The provision of a chamber or space below an inclined feeding hearth, into which chamber the hot gases from the furnace are led in such a manner as to impart their heat to the hearth.

(2) An inclined feeding hearth having a sinuous or zigzag cross section, and having also a space below it into which the products of combustion are led.

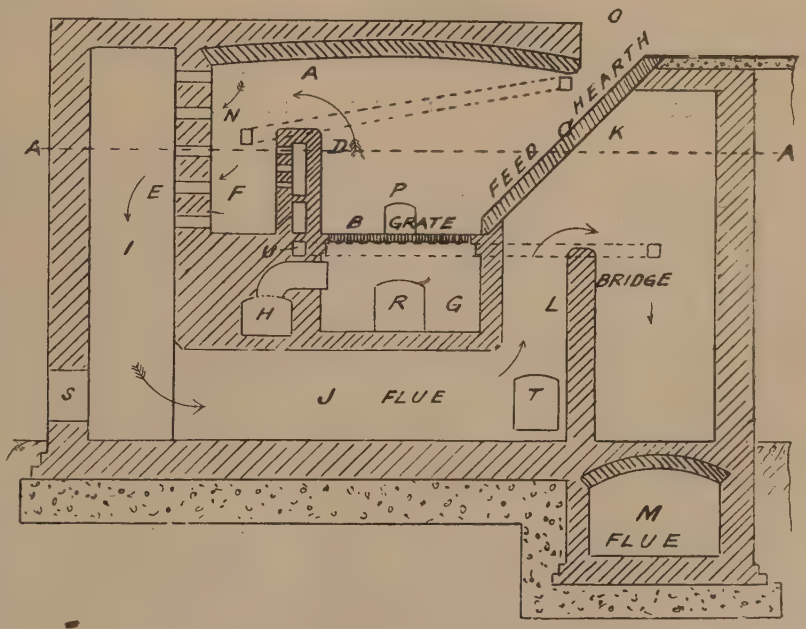

Fig. 22.—Section of Beaman and Deas's Sludge Furnace.

(3) Passages or flues connecting the interior of the furnace near the upper part of the hearth with a hollow fire-bridge or a secondary combustion chamber.

Hanson's Destructor and Utiliser.

This is a recent invention of Mr. John Hanson,

[137] Patent No. 13,029 (1894).

of Wakefield. The main points claimed for the apparatus are as follows:—

(1) A total absence of all fumes.
(2) Cheap first cost.
(3) A large capacity for given cost.
(4) It occupies small ground space for given capacity.
(5) It leaves a residue easily disposed of, and in certain cases saleable.
(6) The cost of treatment by it compares favourably with that of any other system.

The absence of fumes, it is stated, is attained by drawing, from the retorts, the fumes and steam given off by the stuff in drying and forcing them *under* the furnace bars with the forced draught.

A complete set of three Hanson retorts, with boiler in one setting, over three furnaces, with the necessary engine, shafting, screws for conveying material through retorts, riddles, elevators, chimney, &c., cost £1000 erected and ready for work in any part of England. The capacity of this set, as measured over twenty weeks' working at Wakefield, is two tons per working hour, or a capacity of 48 tons per twenty-four hours; and deals with ash-bin refuse, midden stuff, offal, and garbage.

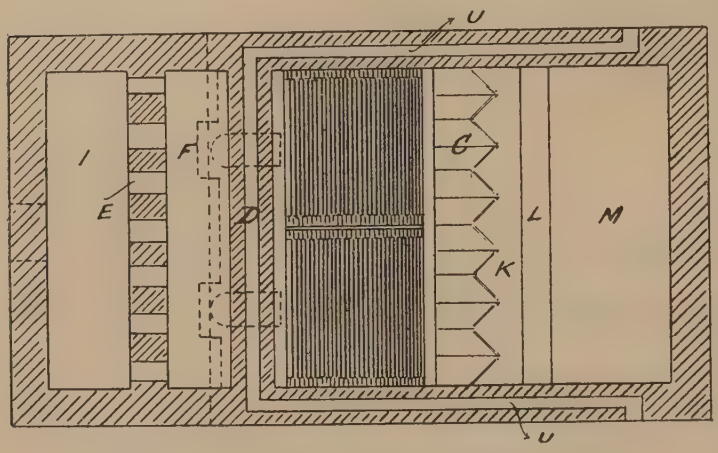

Fig. 23.—Plan of Beaman and Deas's Sludge Furnace.

The ground space occupied is comparatively small. A set of three Hanson retorts (as at Wakefield) measures 17ft. long and 12ft. deep, *i.e.*, it occupies a space of 204 square feet for a capacity of 48 tons per twenty-four hours.

The amount of clinker produced is said to be about six tons per 100 tons of refuse dealt with.

At Wakefield the cost of disposal is given at 1s. 3d. per ton.

Further, as bearing upon the question of economy, it is claimed that the Hanson destructor—requiring no expensive chimney or foundations, occupying little space, having large capacity, and working without smell or nuisance—lends itself to a system of small isolated destructors, each dealing with the refuse of the adjacent district, and so minimising cost of cartage of the refuse. It would appear, however, under such a system, that the cost of management and working must necessarily be increased in proportion to the number of such stations.

The above apparatus was also erected for the Corporation of West Ham.

From a report[138] of a deputation of the Board of Works for the Wandsworth District appointed to visit places in which dust destructors are in use, it appears that Hanson's apparatus was considered by the deputation, and that Mr. Hanson made the two following offers:—

(*a*) To treat the town refuse, not less than 140 tons per week, at a rate of 1s. 3d. per ton; the Board to pay 1s. 3d. per ton for the clinker that they require; the Board to provide land, weigh-bridge, and buildings of a temporary nature, and to collect the dust and deposit it day by day near the utiliser. The account to be paid monthly. He guaranteed to clear away all the surplus at his own cost, and that there should be no nuisance from the process.

(*b*) To erect for £1000 *one machine* called a "*utiliser*" to dry the cinders for fuel and the ashes for bricks and mortar; *two destructors*, side by side, to burn paper, rags, bones, dead animals, door-mats and bedding, also to melt the tin of meat cans, &c.; *one machine* to crush the tins for hard core or old iron.

He stated that the power from the machine and destructors would be 40 indicated horse-power, which would be available for mortar grinding, &c.; and that the above plant would deal with 80 tons per day.

Mr. Hanson was questioned on various matters connected with his method, and he stated that he only required a chimney some 25ft. high, from the top of which neither smell, smoke, or smuts would issue, as all the offensive vapours pass through a second fire. The rubbish generally would be sifted by machinery, and the feeding of the utiliser would be done by mechanical elevators. The destructors, however, which would consume the larger material, would have to be fed by hand.

At West Ham six men were employed to deal with refuse at the rate of 60 tons per twenty-four hours; that is to say, if three shifts of men were employed it would mean eighteen men to deal with 60 tons in twenty-four hours. Mr. Hanson stated that with improved plant labour could be considerably reduced.

"Smoke" is greatly troubling the inhabitants of Bombay. The Chairman of the Bombay Chamber of Commerce declares in his annual address that so little notice is taken of this growing evil that the "beautiful" island is fast becoming a smoky manufacturing district. He says:—"It is surely undesirable, to put it mildly, to allow these mills, ever increasing in number, to go on polluting the air to the utmost bent of their pleasure. It certainly cannot add to the salubrity of the city, and I think the matter is sufficiently aggravated for it to be seriously taken up."

[138] Dated May, 1897.

THE PROPER USE OF LAND IN CONNECTION WITH SEWAGE PURIFICATION.

By W. J. Dibdin, F.I.C., &c.

The best means of employing land for the final purification of sewage has been much debated, but in no case does it appear, so far as I am aware, that the question has been discussed from the correct point of view. In every instance it has been attacked with the view of showing that the land should be employed for the sole purpose of purifying the sewage, rather than with the object of utilising to the fullest extent the agricultural virtues of both land and sewage. Under the conditions of "broad irrigation," or compulsory "effluent farming," the former position was a necessity, as without the fullest effect of the land upon the sewage, the resulting liquid was not fit to be discharged into the stream, and it had either to be sent in unpurified, or on to the land under all climatic conditions, and often to the detriment of the crops.

The recently-introduced bacterial processes of sewage purification have placed the question upon a new footing in consequence of the high degree of purification obtainable without loss of the manurial constituents to the effluent, and the fitness of the liquid to be discharged into any stream, should it be deemed advisable to divert it from the farm.

Under the conditions of broad irrigation, or of land treatment by a chemical effluent, the water is charged with a certain amount of flocculent matter. When this is spread over the land day after day a matted deposit is formed on the surface, which produces clogging of the pores of the soil, or "sickening" at an earlier or later period. Every gardener knows the great importance of freely hoeing the ground in order to "promote growth;" in other words, of allowing the ground to *breathe*. Nothing is more fatal to free vegetation than daily watering the ground, in hot weather especially, without equally frequent hoeing, and thus causing the soil to cake either into a hard, close surface, or, in the case of too much water, turning it into a dismal swamp equally impervious to air. As the frequent hoeing of acres of farm land would be all but impracticable on account of the expense, it becomes a matter for question as to whether the desired result cannot be equally well or even better attained by other means, and with this view I venture to submit the following considerations upon the point.

In watering soil, undoubtedly the best way is to arrange so that the liquid is absorbed into the ground by capillary attraction without disturbing the surface, which would thus remain open and friable, and consequently in the best "breathing" condition. This result can be attained by first ploughing the ground, and, if it be of a clayey nature, applying a plentiful admixture of ashes, and then cutting trenches or furrows at right angles to the declivity, say every ten yards apart. Between these trenches, down the length of the beds, as the intervening ground may be termed, agricultural drainage pipes may be laid at a proper depth, just below the level of the bottom of the trench, or deeper if the subsoil is of an open and porous character. The seed or plants should be sown or set on these beds, and a daily charge of effluent, free from suspended matter, such as that yielded by the fine coke breeze beds worked on biological principles, turned into the trenches. This clear water will be soaked up by the intervening earth, which will thus be kept moist in a degree exactly suited to the exigencies of plant life, and the excess of fluid will find its way laterally through, say, five yards of soil, to the drainage pipes, thereby undergoing further purification in a thoroughly effective manner.

When the climatic conditions are such as to render the application of the effluent to the land inadvisable, it can be sent direct into the river, as the degree of purification already effected in the bacteria beds will be ample. By so doing the manurial constituents in the liquid, viz., the phosphoric acid, potash, and nitrogen, will not be employed on the land, but as the water will not be exerting its functions in "drowning" the land, they will be at least doing no harm. The great advantage of the bacterial system of treatment is that the nitrogen and other matters in their original foul condition are converted into a state in which they are best fitted for the support of vegetable life, just as they appear in an artificial manure. The process which takes place is precisely that which the farmer and gardener employ when they allow their crude, fresh manure to "rot," as they term it. Until this is accomplished they do not think of spreading it on the land. In the same manner, the crude sewage matters are allowed to undergo a process of "rotting"; in other words, disintegration and oxidisation by bacterial agency, in specially prepared beds.

In consequence of the freedom of the bacteria, or "filter," bed effluents, from suspended matter, the trenches will remain pure and sweet, and the land will not become choked with foulness, commonly described as "sickened," and thus with the exercise of proper care the process may be continued indefinitely with the greatest success.

As an instance of what may be done in this way, the experiments made last summer in mint growing at Sutton, Surrey, under the direction of Mr. C. Chambers Smith, the Engineer and Surveyor to the Council, may be quoted. The land was laid out as above described, planted with the ordinary field mint, and irrigated in the trenches, a small plot at the head of the field receiving effluent on the surface in the usual way. The crop of mint obtained was one of the finest I have ever witnessed, except in that portion which received the effluent on the surface. Here the plants were far between, stunted, and scorched up in appearance, whilst those in the beds between the trenches were thick and tall, full of leaf down to the bottom of the stalk, the whole presenting the appearance of dark green beds, on which a giant might recline in luxurious ease.

The financial result was that after paying for the cost of its distillation, the yield of oil of pepermint was sufficient to realise a profit of £20 per acre.

From this experiment it is clear that irrigation over the surface is a great blunder when a good effluent is obtainable, whilst irrigation by means of bed and furrow is not only most efficacious, but profitable in no small degree.

If land can thus be made to yield such a profit, the action of the Local Government Board in insisting upon the provision of a suitable area can be made to turn out to be of the greatest service to the ratepayers. Under the generally existing conditions sew-

age farms are a great loss and inconvenience, and are viewed with widespread dislike by the public at large. The arrival of the bacterial system on the scene promises to reform the old bugbear and turn our land into smiling fields absolutely free from all suspicion of cause of complaint. In the place of sodden ground yielding nothing but rank grass and evil-smelling miasma, we shall have dry top soil covered with a healthy vegetation, the leaves of which have never known sewage, nor the roots either, for the liquid which reaches them will no longer deserve that name. The productive power of the land will be greatly enhanced, and the atmosphere kept as sweet as if no such thing as sewage had ever troubled a much-puzzled committee.

What splendid pastures could be grown in this way, far exceeding in quality and beauty those obtained by surface irrigation. It is becoming more and more clear every day that now we are at last fairly and honestly following the indications of Dame Nature, she is rewarding us with an insight into the possibilities of her system far exceeding the most sanguine anticipations of the past. The cry has been, "Why waste the good manure?" The bacterial process, followed by irrigation, answers, "The manure is here in the best condition, and this is the way the land uses it." Millers want the water turned into the streams above their millrace. The bacterial process jumps to the call and says, "Here is the water, fresh and sweet, and ready for its work." There is no need to spread it over vast acres, and to discharge it below the mill, when in dry weather it is so much wanted above.

Let us then be up and doing, heave the old messy processes overboard, and start forward on the path of true progress with a firm step, stout heart and steady eye, and in a few years' time this question will have been settled for good and all, and our children will wonder how it was we could ever have been so stupid as to produce that embodiment of nastiness called "sludge."

UTILISATION OF REFUSE AND WASTE PRODUCTS.

AMONG the numerous waste products of factories which contribute to the pollution of our streams and rivers, the organic and putrescible refuse from breweries, distilleries, starch works, paper mills, and sizing works are not the least offensive. In Germany a lucrative industry has arisen from the conversion of these matters into a valuable fodder or cake for cattle, pigs, and poultry; damaged wheat, and, in short, anything consisting of starch, sugar, albumen, gluten, and the like, being equally acceptable, alone or mixed. One company at Cassel has for years made enormous profits, in 1895-6 paying a dividend of 38 per cent. on a capital of £75,000, which it has twice doubled since that time, the present paid-up capital standing at £300,000, and last year the dividend paid was 50 per cent., the 100 mark shares selling at 639 m., while from the *Frankfurter Zeitung* of February 9th of this year we find that they are now quoted at 650. This company works under Hencke's patent, his machines being also used by many brewers, distillers, and other manufacturers in their own works. The progress made by the Casseler Drying Company may be judged from the fact that the turnover, which in 1893 was £1,270,546, has risen year by year, until in the first nine months of 1897 it amounted to the almost incredible sum of £7,720,802. We do not wish to play the part of a financial journal, but we must, in a matter which really has a bearing on the public health as well as on the national wealth, express our satisfaction at learning that a company has been formed in this country which, by securing Hencke's patent, together with Cunliffe's, proposes to carry out not only the work of that at Cassel, but also the manufacture of manures from materials the composition or putrescent state of which unfits them for conversion into food for animals, with every prospect of making even larger profits than their German forerunners.

THE SANITARY INSTITUTE.

ANNUAL DINNER.

ON Wednesday, 23rd March, 1898, the annual dinner of the members of the Sanitary Institute, was held in the Throne-room of the Holborn Restaurant. In the unexpected absence of H.R.H. the Duke of Cambridge, the President of the Institute, the chair was taken by Sir Douglas Galton, K.C.B., D.C.L., LL.D., F.R.S., the chairman of the Council, and among a large distinguished and representative company were Earl Fortescue, Earl Egerton of Tatton, Sir E. Galsworthy, Sir Joseph Fayrer, Bart., Sir Arthur Blomfield, Major-General Carey, Dr. R. Farquharson, M.P., Sir Henry Thompson, Sir W. Guyer Hunter, K.C.M.G., Professor Corfield, Dr. Sims Woodhead, Professor H. Robinson, Dr. A. Whitelegge, Dr. W. Garnett, Mr. G. J. Symons, F.R.S., Dr. A. Wynter Blyth, Dr. G. V. Poore, Dr. F. Vacher, Professor H. Adams, Mr. Rowland Plumbe, Dr. Dawson Williams, Dr. A. Newsholme, Dr. J. F. J. Sykes, Mr. T. W. Cutler, Dr. Louis Parkes, Major Lamorock Flower, Dr. W. A. Bond, Mr. Lewis Angell, &c. &c., with Mr. E. White Wallis, the secretary.

The loyal toasts having been duly honoured,

Sir JOSEPH FAYRER, K.C.S.I., proposed "The Navy, Army, and Auxiliary Forces," and said the Sanitary Institute had special relations with the public services, or, at all events, with those exalted personages who represented them. Had H.R.H. the Duke of Cambridge been present he would gladly have offered him their grateful thanks for all H.R.H. had done for their institution and his advocacy of their claims for general support to their cause from its commencement. The Sanitary Institute was deeply indebted to the public services which had contributed to its development and advancement, and it would be a dereliction of duty on his part not to remind them of the great services rendered to it by the distinguished officer who occupied the chair that evening. Having long known from practical experience that their chairman represented sanitary engineering in the highest degree, he had no hesitation in saying that Sir Douglas Galton had done much for the Institute, and that as President of its Council he was one who had conferred an inestimable benefit, not only upon the civil population, but also to the military population of the country, and was entitled to their grateful acknowledgments. Among

others who had helped them were the late Professor Parkes, the late Sir Thomas Crawford, Professor Lane Notter, Inspector-General Macdonald of the Navy, and Sir W. Guyer Hunter. (Cheers.)

Major-General CAREY, in responding, said that in regard to sanitary matters he thought the Army had kept pace with the times. Enormous improvements had been made both as regards barracks and hospital accommodation in all sanitary requirements essential to the health and well-being of the soldiers. (Hear, hear.)

Sir ARTHUR BLOMFIELD gave the toast of "The Houses of Parliament," and pointed out that all their efforts in the direction of sanitary reform and improvement, in which they were all so much interested, and to which they devoted so much time, attention, and energy, were ultimately dependent upon the will of the two Houses of Parliament, without whose permission their measures could not be carried, and sometimes the means could not be provided to carry out those great works in which they felt so much interest. (Hear, hear.)

The Right Hon. EARL EGERTON OF TATTON, in responding for the House of Lords, said he had served his sanitary apprenticeship under the late Lord Aberdare on the Commission on Noxious Vapours. He had also in his capacity as landowner various opportunities of carrying out those sanitary reforms current during the last twenty-five years. In this respect a very great burden had been thrown upon the House of Lords as representing the landowners of the country. He did not say that there might not be exceptions, but speaking generally, he believed the members of the House of Lords had endeavoured to loyally carry out in those buildings over which they had control those sanitary requirements recognised as just. He could not say, however, that all these questions had been satisfactorily solved yet. From his connections with Manchester he had been brought into connection with pollution of both water and air, and he had done his best. He had recently received a communication from New York which seemed to throw further light on the question of the treatment of sewage in large towns—which was a development of the treatment of sewage by bacteriolosis—forcing strong draughts of air through the material through which the sewage is filtered, in such a way that immediately the strong blast of air is passed through the porous material, whatever it may be—cinders or coke—the friendly bacteria clean the whole thing out, and render it available for further treatment of sewage. If this could be established before the Royal Commission which was shortly to be appointed he believed we should get a scientific and economical way of dealing with the sewage of large towns. He could assure them that in dealing with the sewage around Manchester they had a very serious problem, in which he was deeply interested. He hoped that in time the air would in some way be made purer. Science was much at fault in dealing with smoke and the combustion of coal in our large towns, and he hoped that in the following century they might see pure air and pure water, so that they would be able to say that science had triumphed over the difficulties which enormous populations, congregated in large centres, had brought upon us more rapidly than men of science had been able to deal. (Applause.)

Dr. FARQUHARSON, M.P., in an amusing speech, replied for the House of Commons. He said that when he had had the honour of taking the chair at the Sanitary Institute not long ago he took the opportunity of saying that he had very little confidence in the House of Commons in matters of hygiene. That was quite true, for he thought both parties bad, though he thought also the party to which he was opposed was rather better than his own in this respect. But too much obstruction was put in the way of either party whenever they attempted to do anything for public hygiene. Both parties united in supporting a proposal for expenditure for the protection of our Empire; he wished it were so in matters of hygiene. What they wanted was a strong backing from outside, and he could assure them members of Parliament were very amenable to pressure from their constituents; the obstruction and opposition in the House of Commons was very discouraging to those who were trying to do a little work for the cause of sanitation, but in spite of all its defects the House of Commons was a great institution, and he did not think they had occasion to be ashamed of it. (Cheers.)

Sir E. GALSWORTHY, Chairman of the Metropolitan Asylums Board, proposed the toast of the evening "The Sanitary Institute," and said that Dr. Farquharson had said the work done by the House of Commons was great in quantity, but he gave no opinion as to its quality. Now, the House of Commons in this respect differed very greatly from the Sanitary Institute, and the House of Commons must be an inferior body. (Laughter.) For the work done by the Institute was both great in quantity and admirable in quality. It was founded in 1876 exclusively for the advancement of subjects which bear upon public health. He referred to the various developments which had taken place, to its congresses, lectures, classes, examinations all over the country, and said all branches appeared to have steadily grown, and all who desired to aid the important work of improving the public health ought to support and co-operate with it. The Metropolitan Asylums Board, which seemed to exist for the benefit of the halfpenny evening papers—(laughter)—was most anxious to co-operate with the Institute, and if its work resulted, as it should do in the diminution of suffering and disease, then perhaps the Board would be a little more economical than it is at present. He could congratulate the Institute on the splendid work it had done, and upon its sound financial condition, which spoke well for the Institute. (Applause).

The toast was enthusiastically drunk.

The CHAIRMAN, who was cordially greeted, in responding, said it was pleasing to find the Institute so well appreciated by the head of one of the most important sanitary departments in the metropolis. There were few branches of science which had made such progress during the reign of her Majesty as sanitation, and they would all agree with him that that progress had been largely due to the chemist and the physiologist, and more recently to the psychologist. Sanitarians had much to thank the progress of other sciences besides their own in these respects. But he was afraid they must all feel that sanitation had not penetrated into the nation in the way it should have done. He was Chairman of a Sanitary Committee of a County Council, and he found that numerous pollutions were going on from the houses and

small towns into the water supplies, which might have been arrested at their origin but for lack of education. (Hear, hear.) There were other matters in which he thought our sanitary services were singularly wanting, and the appreciation of the public for sanitation was equally indifferent. Large quantities of butter were being brought from the Continent made with preservatives which are dangerous to health. Steamboats were being constructed for the purpose of bringing milk from abroad to this country which would be similarly adulterated, and no efforts were being made at the ports of entry to prevent the distribution of these adulterated articles. Through the care and efforts of Dr. Corfield, and also of the Local Government Board, the quarantine had been abolished; that was a very desirable measure, but it was accompanied by a measure that all persons arriving by a suspected vessel should be carefully examined and watched for some time afterwards to see that no infection broke out amongst them. Similarly, if we admitted butter and milk free of duty, care should be taken to see that those articles were pure and did not contain matter injurious to health. He was afraid that with all their self-congratulations as to the progress of sanitation they must admit that the nation had only as yet touched the fringe of the question. So long as the higher sanitary administration of the nation remained an appendage of the Poor Law administration there could be no proper care for the health services of the country. (Hear, hear). The sanitary care of the metropolis was scattered under many Authorities, all separate from the other. In the counties and in the small towns, even in some important towns, sanitation was not appreciated. In many places Medical Officers, Public Analysts, and Sanitary Inspectors were badly paid, and nowhere have they that certain tenure of office which is necessary to ensure the fullest devotion to the services in which they are engaged. The nation still remained largely supine and somewhat ignorant of its true duties in this respect. The Victorian era had undoubtedly developed sanitation, and the improvement which it had introduced originated with pioneers like Budd, Parr, Smith, Parkes, Rawlinson, Chadwick, Richardson. But with justice he might claim that the Sanitary Institute had had an important share in the progress made during the latter years of this century. The Sanitary Institute was founded no doubt as a consequence of the recognition by Parliament in 1872 of the importance of codifying and improving the scattered laws which up to that time had regulated the sanitation of the country. The Sanitary Institute was founded for the purpose of educating the public in the requirements of this new science. It had largely fulfilled the mission which its originators set before them. They assimilated to themselves the Parkes Museum; they had developed, and now maintain it, not as a place for the display of the wares of manufacturers, but as a well-considered exhibition of what is newer and best, and the latest applications of the science of practical hygiene. As an evidence of the appreciation in which it is held, he might mention that it was visited in 1897 by 17,500 persons, and that fifty-three different institutions sent classes there to be instructed by their own professors. The Sanitary Institute held congresses in various important centres, to which the leading Sanitary Authorities throughout the country willingly came, because they were able to discuss and exchange views upon important questions which interest them. Exhibitions in connection with those congresses had been held during the last twenty years, and by the adoption of a careful and systematic method of judging exhibits they had preserved not only a continuity, but had established a uniformity in the principles upon which the awards are based. Owing to the Sanitary Institute a feeling had been created, and it was gradually spreading in the public mind that it is of the first importance that the officers who administer the sanitary laws should be thoroughly qualified for the offices they hold. The Institute originated examinations in sanitary knowledge for Sanitary Inspectors and borough surveyors, but the Surveyors' Institute, the British Architects, the Civil Engineers, had perceived how important this class of knowledge is, and those bodies now required that sanitation should be a branch of the examinations which they now require those who join them should possess. But the Sanitary Institute at present remained practically the sole examining body for Sanitary Inspectors, and it had devoted much time and labour to improving the education of those persons; 2400 certificates had now been issued for competency and qualification to hold the offices of Sanitary Inspector. Through much difficulty and through many troubles they had attained to their present position; the Institute had not more than 2000 members; it had an invested capital of nearly £11,000, and an income in excess of expenditure, and they devoted that income entirely to extending their influence and usefulness. (Cheers.) The past principles of the Institute had been to devote their funds entirely to the maintenance of their museum and library, and the organisation of lectures, not only for the public, but chiefly for the education of Sanitary Inspectors, for whom they had provided special lectures in various parts of the country. They now contemplated establishing classes to supersede those lectures because it was believed classes would be more effectual means of education than the lectures. Further, the lease upon which they held their premises had not many years to run, and they were now considering how to extend their usefulness either by an addition to their present buildings, or by the acquisition of a new site. They had progressed steadily in the past, because they had had before them a single-minded desire to convey to the nation a due appreciation of the value of sanitation, and to assist its progress; and so long as they continued to administer the Sanitary Institute on the same lines he did not think they need have any fear as to its future progress in usefulness and in success. (Loud cheers.)

The proceedings then terminated.

ARRANGEMENTS FOR THE BIRMINGHAM CONGRESS.

The proceedings of the Congress to be held in Birmingham next September in connection with the Sanitary Institute were foreshadowed on Thursday, the 24th ult., at a preliminary meeting at the Council House, presided over by the Lord Mayor (Councillor C. G. Beale). The Congress will meet from September 27th to October 1st, the

formal reception of the members on the first day being followed by a public luncheon and the delivery of the inaugural address by the President, Sir Joseph Fayrer, Bart. Conferences will be held on various topics on the Wednesday, and a conversazione and reception will take place in the evening. Thursday and Friday will be devoted to sectional meetings, at which important papers will be read and discussion invited on sanitary science, engineering, &c. There will, of course, be the usual excursions and visits to places of interest in the neighbourhood, Saturday, the last day of the Congress, being occupied entirely in this way. The feature, however, that will perhaps appeal most to the general public will be the exhibition of sanitary appliances, &c., that will be arranged in Bingley Hall. The exhibition in Leeds last year was a great success, and beat all previous records, but it is anticipated that the one to be opened in Birmingham will be far larger and much more interesting and representative than any of its predecessors.

LOOKING AHEAD: A PEEP INTO TWENTIETH CENTURY SANITATION.

By M. Ingram, Manchester.

(*Continued from page* 312.)

The good existing sewers remain substantially as they were made under the old system, but nothing is allowed to enter into them, only that which falls from the clouds; but if from any class of manufacturers' waste, it is made equal in purity to rainwater *when it enters the sewers*. This is a condition precedent before it is allowed to enter such sewers, and any infringement of the *law* in this respect is punished by fine or imprisonment, and we now find our rivers, in which Waltonians delight to ply their hook and line, restored to their ancient purity.

Now let us see how the system works out in actual practice. For this purpose let us take a typical place, Manchester and Salford, for instance, where there are, we believe, six main arterial railways radiating from their centres, each one of which has placed along its course an iron outfall main sewer pipe of comparatively small dimensions, the largest of which is but 18in. in diameter, whilst others are much less. This is managed by reason of mapping the city and borough into small drainage areas or districts, and every district has its own main into which every house in such district is connected. The course of this main is always in the direction of the principal arterial tubing, which, as before mentioned, takes the course and direction of the various arterial railways into which all the pipes from all the various districts ultimately join; in short, very much as the present water supply pipes, with this difference, the flow is *from* the house, and not to it, as in the latter case. The "flow" or motion of the materials inside the pipes is brisk, if not very rapid, and is always towards the open country. The sewage consists of a comparatively small quantity of water, sufficient only to carry the solid matter forward, which solid or other putrescible matter having previously by a simple manner been rendered innocuous by a chemical preparation at the moment it is discharged into the drain tube, and at all suitable points of the route, but away from inhabited houses. The main pipe is tapped, as it were, and its contents used upon the land, the fertilising qualities of which make it much sought after by farmers, who have at disposal a manure ready at hand at any hour to apply to the soil, when and how experience has taught them to be most beneficial.

Be it observed that a considerable impetus could not be maintained in the pipes, either main or branch, without some motive power being employed. This, however, is not considerable, by reason of the gradients being so easy; the power needed is comparatively small and inexpensive, for at suitable positions pumping stations are erected and atmospheric air is forced into the pipes, forming an air current in the direction desired, and thereby accelerating the flow of sewage, preventing any stoppage, aërating the contents of pipes, and making a leakage of sewer air *into* the house an impossibility, and also making the sewage harmless to handle at its ultimate point of disposal upon the land.

The ventilating pipes from the drains as formerly employed, are things of the past; the unsightly pipes attached to the house, as well as the unsavoury grids in the street, are tolerated no longer by an intelligent people, who make their sanitary surroundings their first duty, and impose the same obligation upon those sent to represent them in the Imperial or Municipal Councils—indeed, a jerry builder or a "bodging" plumber would stand no chance of election by so intelligent and so enlightened an electorate.

We have seen what progress has been made in the collection and disposal of the wastes of life in a few years, by reason of the removal of restrictions and vexatious and harassing legislation, and by means of public opinion, making public health the watchword and the battle-cry of both political parties—a contest in which all electors make a point in taking an active and an intelligent part.

Let us take a look inside a domestic dwelling, and notice some of the changes made both in form and principle in some of the sanitary appliances therein, the most noticeable of which is the water-closet, which, by a process of evolution, has changed from the large porcelain basin to a small metallic receptacle, in shape somewhat similar to a double ellipse, with its longest dimension about 12in., whilst its shortest or transverse width is but from 3in. to 4in. It has a seat suitably poised, and supported in such a manner that when in use the deposit is made in that portion of the receptacle, which is prepared specially for it by its peculiar formation of its bottom portion. On rising from the seat a suitable metallic disc or lid falls into a place prepared for it, and covers the orifice of the basin, provision being made by the peculiar construction of both basin and lid to make it water-proof, and also to withstand the water pressure to which it is later on subjected, in order that the contents may be forced right away, far into the drains previously referred to. The water supply is on the high-pressure principle, and by this means it is found that about one quart of water is quite sufficient, not only to thoroughly cleanse and flush the basin, but also to make the joint between the disc and the basin. At the completion of this very successful flushing operation, a small charge of a chemical compound is then ejected into a basin from a suitable receptacle by means of compressed air, which chemi-

cal mixture is deposited inside the basin ready to receive and amalgamate with its next contents. This chemical preparation is a cheap by-product, and is supplied gratuitously by the Municipal Authorities. The mechanical motion required to accomplish this last operation is obtained by the act of moving from the slip in front of the water-closet basin. Amongst the other novelties of this closet it has no trap, and the soil pipe is but 2in. in diameter, and is made of strong iron and porcelain enamelled inside. Bearing in mind that some considerable pressure is maintained in the public drains, a kind of back-pressure valve is fixed in a suitable position, which thus cuts off all direct communication therewith.

An installation of compressed atmospheric air is now considered a public necessity, hence no domestic residence is deemed complete without it, and no intelligent householder would occupy a house without this provision, the beneficial uses of which are so advantageous in giving motion to the atmosphere in sick and other rooms, as well as providing the means for ventilating and warming the whole house whenever required.

The lavatory and bath have undergone but little improvement; they are, however, in more extended use than formerly, and every house, however small, is now provided with these indispensable sanitary appliances. Indeed, it is considered public policy to encourage the practice of frequent ablutions, therefore every facility is afforded by the provision of a gratuitous supply of hot water for this purpose, the waste from which is taken into the storm outfall drains.

Waste water from the scullery and slop sinks is taken into the arterial drains in a manner somewhat similar to the connections from water-closet apparatus. The ruling principle guiding all these sanitary methods is to prevent stagnation in any portion of a household, and all removable objectionable matter is removed the moment it is desired. This principle also applies to the removal of domestic refuse. There is no accumulation awaiting the arrival of a collecting van, or the crude methods of the same, nor transit through the streets polluting the atmosphere by the floating particles of its contents along its entire course to its destination. The principle now adopted is to place the refuse within a suitable iron receptacle, porcelain enamelled inside, and upon securing the cover, it is "whisked" instantly away in pipes provided for this purpose by means of compressed air, to depôts suitably situated, when it is ejected with some force right into a crematory furnace, the heat thus obtained being used to supply power for compressing air, providing hot water for domestic supply, lighting, and other industrial purposes.

In some districts where it is either inconvenient or impracticable to connect the sewage pipes to the arterial drains, both the liquid and the solid refuse is converted into gas for lighting or heating purposes without personal manipulation of any human being whatever, but by the same mechanical methods already named.

It has been found that batteries of muffle furnaces electrically heated are more efficient and less costly than the old retorts for converting this combined wet and dry refuse into gas. At the same time the by-products are more useful and more valuable.

INQUIRY INTO THE CONSEQUENCES OF THE DEPOSITING OF TOWN REFUSE.

K. KRATZ, Ph. Doc. of the Hyg. Inst. of the University of Giessen (Z.f.H., u. Inf. B. xxvi. H. 2), in view of the fact that through the expansion of towns, sites selected as shoots for the deposit of dust, slops, and refuse of all kinds, frequently become surrounded by houses, and are sometimes disused and built over, undertook a minute investigation of the condition of the site of that at Giessen, and the pollution of the soil, with the influence it might exert on the health of the neighbourhood, and of the houses that might later be erected thereon. The procedure he followed was that adopted by Proskauer at Berlin, and deserves attention for its exhaustive character. He began by making twenty nearly equidistant borings, from 3 to 4½ metres in depth, to the natural soil beneath, taking samples at each metre downwards. One hundred grammes from each sample dried at a temperature of 100 deg. Cent. were diffused in one litre of distilled water, and the filtrate examined as for potable waters; the soil itself was roughly examined for organic and inorganic matter, water, and iron; and the ground air pumped from different depths for CO^2 and H_2S, &c.; the temperature at each metre from the surface was taken, and the influence of the rise and fall of the contiguous river Lahn on the movement of the ground-water determined. Lastly, the bacteriology of the natural and of the "made" soil, both crude and sifted, was thoroughly studied at each metre or half-metre in depth, including the natural subsoil underlying the refuse, which the borings frequently penetrated to a depth of one to three metres. The activity of the nitrifying and denitrifying bacteria, which cannot be cultivated like others, was estimated by the rapidity with which they effected the disappearance of ammonia, nitrates, and nitrous acid from solutions of ammonium nitrate and sulphate. The only pathogenic microbe sought for was that of tetanus. Twenty mice were inoculated with watery extracts from as many samples taken from ten of the borings, including those in the natural meadow. Of these twelve died tetanic, the soil from the meadow and some samples of the natural subsoil beneath the made earth proving inert, but all those of the latter which were thus tested being infective. The analyses of the water from the infusions give a good idea of the extreme pollution of the made soil, and frequently of the subsoil, and the danger to health not only of the persons occupying houses built on such sites, but also of those who should drink the water of wells sunk in the immediate neighbourhood.

POPLAR.—On Wednesday afternoon, the 23rd ult., the dust destructor erected by the Poplar District Board of Works on land in Glaucus-street, Bromley, at a cost of £11,000, was opened by Mr. Mark Dalton, J.P., Chairman of the District Board of Works, in the presence of a large number of representatives of the District Board. The site was procured at a cost of £3500. The destructor, which contains fourteen cells, is calculated to destroy about 130 tons of refuse per diem, and the shaft is 150ft. from the surface of the ground.

Sanitary Inspectors' Associations.

WESTERN.

A MEETING of the Western Branch of the Sanitary Inspectors' Association was held at Gloucester on Saturday last, and was attended by a large number of delegates. A reception was held by the City High Sheriff (Mr. A. Woodward) and Mr. A. King (Chairman of the Sanitary Committee of the Corporation) at the Guildhall, when the Association was heartily welcomed by Mr. King and the City Sheriff on behalf of the city; and Mr. Macmahon, Chairman of the Western Branch, suitably acknowledged the greeting. At a general meeting of the members held in the Bow Committee Room, the hon. secretary (Mr. T. J. Moss Flower) and Mr. Kirley (Bristol) announced that they had written to the members of the Bristol district asking them to support the Bill to be introduced into Parliament for securing tenure of office and superannuation for Sanitary Inspectors. They had pointed out that Poor Law officers were already protected in this way; but the Sanitary Inspector, who daily carried his life in his hands, was not. Mr. Lewis Fry, M.P., and Colonel Sir E. Hill, M.P., had promised, the first-named to support, and the second to favourably consider the matter; but the Right Hon. Sir M. E. Hicks-Beach replied that it would be contrary to rule for him, as a member of the Government, to allow his name to be placed on a public Bill which was not introduced by the Government.

A public meeting was subsequently held in the Assembly-room of the Guildhall, Councillor King presiding, when papers were read by Mr. R. Read (Gloucester), on "Notes on Sewerage, Drainage, and the Water Supply of Gloucester;" by Mr. T. G. Dee, Westminster (Chairman of the Association), on "Tenure of Office;" and by Mr. W. H. Grigg, Fulham (Vice-Chairman of the Association), on "Some Reminiscences of Our Belgian Visit." Mr. F. W. Waller and Mr. Medland described various buildings to be carried out by the Corporation at Gloucester, and the members afterwards dined together at Garrett's Restaurant; Mr. King again presiding. A number of the delegates subsequently drove round to inspect places of interest in the city.

NORTH-WESTERN AND MIDLAND.

A MEETING of this branch of the Sanitary Inspectors' Association was held at Stafford on Saturday last. Prior to the meeting the members visited the Royal Brine Baths, the County Buildings, and the Corporation Sanitary Depôt and Sewage Works, they being conducted by Mr. W. Blackshaw, the Borough Surveyor, and Mr. J. Evans, the Borough Sanitary Inspector. Dr. G. Reid (the County Medical Officer) presided over the meeting, which was held at the Shire Hall, and there were also present Mr. W. Urquhart (Crewe), chairman of the Council, Mr. H. H. Spears (hon. secretary, Waterloo), and representatives from Birmingham, Uttoxeter, Stafford, Seisdon, Hanley, Smallthorne, Audley, Liverpool, and Nottingham.

A memorandum from the Society of Public Analysts respecting the proposed amendment of the Sale of Food and Drugs Act was referred to the Council for consideration and report. The main points in the memorandum were that a court of reference should be constituted, and that the recommendations of the Select Committee which had sat on the question should be incorporated. The Secretary explained the chief provisions of the Sanitary Inspectors' Appointment and Superannuation Bill which was shortly to be brought before Parliament. The promoters of the Bill seek to obtain greater fixity of tenure for Sanitary Inspectors, it being pointed out that at the present time Inspectors were placed at a disadvantage in that they might have to serve notices to abate nuisances on persons who occupied positions on the Boards invested with the power of appointment and dismissal. The Bill laid it down that the dismissal of Inspectors should rest with the Local Government Board.

Mr. LOWRY (Seisdon) proposed that the Bill should be approved, and the motion was seconded by Mr. WATERS (West Bromwich), and carried unanimously, and it was left to the Council to organise a movement in favour of the Bill among the members of Parliament.

The SECRETARY presented a report on the proposed amendment of the rules of the Association so as to facilitate the creation of district centres, and it was decided, on the motion of Mr. LOWRY, seconded by Mr. HIGGINSON (Audley), that a Midland centre shall be established, a provisional committee, with Mr. Carter (Birmingham) and Mr. Kent (Hanley) as joint secretaries, being formed to make the necessary arrangements for giving effect to the motion.

Mr. A. KENT (Hanley) read a paper on "The Protection of Water Supplies." He said that there was no part of the work of a Sanitary Inspector which exceeded in importance that of the water supply, as the health of a whole community depended upon a pure supply. Public bodies, especially in rural districts, had to contend with great difficulties, the procedure necessary to get a good supply of water being cumbersome, and he contended that more extensive powers were necessary in order that the health of the people may be better safeguarded. Power should be given to Local Authorities and their officers to enter waterworks from which the public were supplied in order to take samples for analysis.

The CHAIRMAN said that the rough-and-ready test suggested by Mr. Kent would not be of any value, as though it might show that the water was bad it would not show that it was good. Mr. Kent was thanked for his paper, and the meeting ended.

MAIDSTONE. — During the typhoid epidemic eighty-four nurses and attendants allowed themselves to be vaccinated with the lymph, and of these not one contracted the disease. On the other hand, 120 refused to be vaccinated, and of these sixteen were attacked.

QUEENSBURY. — A Local Government Board inquiry has been held into the application of the Urban District Council for powers to borrow £1500 to provide a water supply scheme for the mountain portion of the district. The scheme has been rendered necessary owing to the fact that the present reservoir is on a level below this portion of the district, which has a population of about 600.

Institute of Sanitary Engineers

THE SANITARY ADMINISTRATION OF BELFAST.

(*Continued from page* 316.)

During the cholera alarm of several years ago the Port Sanitary Officer carried out the same system upon all vessels and their crews arriving from suspected ports. To allay any reluctance on the part of the sailors, the officer always underwent this fumigation with them, finding no ill result from it.

One of the most important questions that can claim the attention of a Health Department is the disposal of the town refuse. It has been previously stated that the Belfast Corporation periodically cleanses all ashpits at the expense of the rates. The disposal of the material is a problem of no small difficulty, varying as it does so largely in composition. So long as a large proportion consisted of organic matter, it could be collected at the Corporation manure yard and sold to farmers at a price sufficient to materially reduce the cost of collection. But as the contents of the pits became in a larger proportion ordinary ashes, and in view of the outcry against the existence of such a manure yard within the City boundaries, this method of disposal has become, at the same time, more difficult, as well as less profitable. It is not surprising that the Corporation manure yard has therefore shrunk in size by at least one-half during the last four or five years. The question of a refuse destructor has been at intervals before the Council, and its adoption cannot now be much longer delayed. The refuse to be disposed of by a Corporation may be divided in the main into four different classes. First, the ordinary road scrapings. The organic matter in this is seldom of sufficient amount to render it unsuitable for ordinary filling-up purposes, and would be still less so if the Corporation extended their excellent practice, at present confined to two or three leading thoroughfares, of gathering up promptly all the manure that falls, and which among other advantages must tend greatly to mitigate the obnoxious character of street dust. The second article to be disposed of is the ashpit contents, and in connection with this, and which would render it more easily dealt with in a destructor, should be the compulsory covering over, as previously suggested, of every ash pit. The third class is the stable and cow-house manure. Very little of this has to be dealt with by the Corporation, as the owners find a ready market for it. The fourth is a miscellaneous class, and consists of all sorts of rubbish from business places, houses pulled down, dead animals, paper, straw, &c. The filling up of waste ground has already been referred to. During the past year permission has been given by the Public Health Department for rubbish to be deposited upon several pieces of waste ground, mostly upon the river bank, and upon the understanding that no building should be erected upon the ground for seven years. The Corporation have availed themselves of their own leave, and made large deposits themselves upon these sites. Judging from the composition of one of these, seven years is by no means long enough to prohibit building upon. It is, in fact, a large spoil bank, 150 yards long by 50 yards wide and 10ft. in average depth, and the innocuous portion of its contents appears to be decidedly in the minority. I am inclined to think that this, as well as some other lapses from strict sanitary propriety, have been perpetrated to a great extent without the knowledge, and with merely the nominal sanction of the higher Authorities. Permission is given to fill up certain spots under what appears to be reasonable safeguards, and the door once opened, advantage is taken by all sorts of persons to get rid of all sorts of objectionable matter, and even the city scavengers, doubtless to save themselves a little trouble, become the chief offenders. The existence of a destructor would take away one excuse; the presence of a policeman with eyes and a very little common sense, would prevent much. Or, were this not feasible, a small charge might be made, enough in part at least to pay for a watchman having power to turn back or otherwise deal with anything that was obviously unfitted for deposit.

The notification of, and the methods of dealing with, zymotic disease, have already been touched upon, and it might perhaps have seemed more logical to have discussed its prevention at the same time. The topics are, however, sufficiently distinct as not to render it out of place to treat them separately. In this place we may confine ourselves, to two or three of the more important, or at least those which appear with the most regularity and persistence, because some, like scarlet fever and measles, however serious, depend so much upon outside influences, and fluctuate so greatly, that we may for the present put the discussion of them aside.

The three which occupy a place of more regular persistence, and upon which a Public Health Department is expected to have a definite policy, and also as to which Belfast holds a rather unenviable prominence, are typhoid or enteric fever, diphtheria, and phthisis. Especially in the first and last of these our death-rate is abnormally high. With regard to typhoid, Sanitary Authorities would be in a much surer position if they could always put their finger upon the cause. No doubt they can, and have done this in such cases as those recent epidemics at Maidstone and Lynn, and as in numerous others traceable to particular contaminated milk supplies. But in Belfast (and in Dublin also) there seems to be a regular sporadic existence of this disease, varying but little from year to year, and so distributed as to point to no single source for the infection. For many years the popular idea, both in the medical profession and the public, was that in sewer air or sewer "gas" we were to look for the chief cause of this disease, and this has gone to such an extent that there has been a perfect craze upon the subject of drains. The plumber and the sanitary engineer have reaped a rich harvest from this state of things, and whenever a case of typhoid has occurred the doctor has naturally asked after the drains, and if a leaky joint has been discovered anywhere in the vicinity of the house, it has been immediately set down as the originating cause. Recent investigations would seem to show, however, that we may have been at least somewhat premature in our conclusions.

The researches made by Mr. Parry Laws at the instance of the London County Council into the micro-organisms to be found in sewer air may give the sewer-gas panic-mongers a moment's pause. According to Mr. Laws the number of pathogenic organisms in the air of sewers is no greater, and sometimes even less, than in the air outside. More striking still is the fact that those which are found are not such as inhabit sewage, but have mostly been introduced from the air outside, and are of the same class as are found elsewhere. Nevertheless, while typhoid is to be found in every district of Belfast, it is somewhat more prevalent, in general, in the hillside parts of the town, and those in which it might be presumed there was a greater chance of the gases rising through leaks of the drains or forcing defective traps. Sir Charles Cameron, the Medical Officer of Health for the city of Dublin, and whose name carries with it no little authority, has started the suggestion that "underground air" may be one of the chief vehicles for conveying the typhoid bacillus or its germs. This theory does not seem to present quite so much difficulty as the case against sewer gas does, and tends partly to explain some of the caprices and fluctuations of the infection. It is not surprising, when one comes to think of it, that the latter should not contain many sewage microbes; so long as the sewers are freely running and their sides remain moist they are not in a condition to communicate them to the air. In soil, on the other hand, which has become saturated with the percolations from defective drains, or pervious ash-pits, and in which there are alternations between moisture and dryness, the soil when continuously moist may give out few or no germs into the air, but when dried the germs would be freely given forth, and either be sucked upwards by the warmer air of the houses, or else forced upwards by the advancing moisture when a wet season intervenes. This in part would explain the frequent increase of typhoid after the commencement of the autumn rains. It might also explain what at first sight appears the anomalous fact, that in the lower and oldest parts of the town, where the drains were in general not only defective, but constantly dammed back by the rising tide, and the subsoil presumably fully saturated with sewage matter, there should actually be less typhoid than in the upper districts, for the most part built and drained within the past twenty-five years. The street drains in these having a rapid fall may frequently have their sides comparatively dry, and be much more likely to communicate germs into the air; and the subsoil, though relatively not perhaps as foul as in the lower levels of the town, would nevertheless be much more exposed to seasonal fluctuations of moisture and dryness. Nothing has here been said as to water-borne sources of infection, because there is no clear evidence that this has had much to do with the disease in Belfast. The water supply has of late years been ample. It generally amounts to thirty-five gallons per day for each person, the gathering ground is almost entirely moorland, and the water has been for some years all filtered. When the new supply from the Mourne Mountains, in the south of the County Down, comes into use, as it will before long, the Belfast water supply will equal, if not surpass, that of any city in the United Kingdom.

Notwithstanding the great progress made in recent years in public sanitation, the continued persistence of diphtheria has taxed the energies, and has not been to the credit of sanitary reformers. It is to be feared that the spread of popular education, now everywhere made compulsory, is to be held partly responsible for this. The crowding together of so many children of the poorer classes must greatly facilitate the spread of infection, especially as the ignorance or apathy of their parents renders them less watchful of the beginnings of illness than those of the more educated classes generally are. The National Schools are, of course, subject to regulations as to lighting, ventilation, and overcrowding, though whether these are yet sufficient may perhaps be doubted, and in some respects Medical Officers of Health would probably like to see them extended. There must be a very large number of private schools frequented by children of the middle class which practically are under no supervision whatever. In these young and susceptible children are, it is to be feared, often packed far too closely, and with no sufficient intervals for exercise, or for the changing the air, into rooms in private dwelling-houses by no means adapted for the purposes of a school. Under some clause or another, or under the general scope, of the Public Health Act, the Corporation ought to find power to make rules to govern such cases. In all cases, public and private, it can hardly be doubted that more frequent recess intervals, however short, would be of great help in promoting the health of the scholars, and, for that matter, of the teachers also. Musical drill, while the windows were open, would also provide exercise and ventilation, without risk of taking cold.

But the great scourge of all is phthisis. It is almost a pity that this phrase has not been superseded by "tuberculosis," as being more comprehensive, because the disease is by no means confined to the lungs, and part at least of its mortality is due to other parts of the body, and in this respect a stricter definition might help us to fuller measures of precaution.

Some of these have been considered under the subject of cow-houses. It has been also stated that this is peculiarly a disease of *houses*, and more than that it is also peculiarly a disease of the *poor*. From what we know of it we need hardly be surprised at this. The infection—for in the truest sense of the word it is infection—comes mainly from the sputa of those who suffer from it. When this is carelessly, or at least ignorantly distributed over the floor, it is bound, when dried and swept up or otherwise disturbed, to constitute an atmosphere laden with disease germs. It only remains then to provide lungs or throat affected by an acute state of weather, or a debilitated system, to furnish a suitable cultivation ground for the disease. The question how to meet it is a problem of no small difficulty. One thing that may help us is this, that the tubercle bacillus dies speedily under the influence of direct sunlight, and doubtless also free oxygen is unfavourable to it.

(*To be continued.*)

FOLESHILL.—The Rural District Council has received a letter from the Local Government Board expressing regret that the Council had been obliged to put up a temporary iron hospital to cope with the outbreak of typhoid fever, and urging them to endeavour to obtain a permanent hospital.

General News.

YARMOUTH.—The sanction to the loan of £12,000 for the destructor has been received.

BRIGHTON.—The Local Government Board has sanctioned a loan of £2480 for twenty years on account of the refuse destructor.

BOLTON-LE-SANDS.—Plans for sewer extension have been approved by the Parish Council. The cost of the scheme is about £500.

LEAMINGTON.—The Town Council has borrowed £5500 for carrying out the work in connection with the supplemental borough water supply at Lillington.

STOURBRIDGE AND HALES OWEN.—Arrangements are to be made for the borrowing of £10,000 for the erection and equipment of the hospital and acquisition of the Hagley Green site.

LLANELLY.—The estimated cost of the proposed Llwynhendy water supply is £1700. The Rural District Council has now resolved that Furnace and Sandy be included, and that the plans as drawn out be accepted.

NORTHAMPTON. — The Town Council has decided to acquire a destructor for the disposal of the town refuse, and to provide a steam disinfector, a weighing machine, steelyard, and fittings on Wood-hill, and to construct an underground public convenience.

INVERURIE.—A meeting of the special committee appointed at the stated meeting of commissioners was held recently for the purpose of considering as to the desirability of having a public slaughter-house erected within the burgh. After full consideration, it was agreed to hold a conference with the butchers to consider the question.

TUNBRIDGE WELLS.—The Borough Surveyor (Mr. E. Mellor) has just submitted to the Waterworks Committee of the Town Council a scheme for new filtration works at Pembury, where the reservoirs are situate. The estimated cost of the scheme will be about £20,000, and before the next meeting of the Council, Mr. Strachan, engineer, is to be consulted.

LANGTON MATRAVERS.—As a result of the Local Government Board inquiry which took place with regard to the contemplated borrowing of £1000 for the purpose of a water supply, the Board has intimated that it does not consider the scheme satisfactory, and desires to be furnished with a geological report. The District Council has now agreed that the report required be obtained and forwarded.

WITHINGTON.—The Local Government Board inquiry into the application of the Urban District Council for power to borrow a sum of £5500 for the purchase of land on which to erect an infectious diseases hospital on the Baguley Lodge Estate was resumed on Thursday, the 24th ult. The burden of the case for the opposition was that the site in question was unsuitable for drainage purposes, and that the surrounding property would deteriorate in value if the hospital were erected.

GRANTHAM.—The Grantham Waterworks Company propose to considerably increase the present plant at their pumping station.

BRAMLEY.—A loan of £1250 has been obtained by the Guardians from the Leeds City Council for the furnishing of the new hospital.

ROWLEY REGIS.—It was reported at a recent District Council meeting that the Staffordshire County Council had decided to take steps to adopt a scheme to make joint hospital districts, and under the circumstances it was decided not to entertain a proposal for the Oldbury District Council to remove small-pox patients to the Tividale district.

BLYTH.—At a meeting of the joint Councils of South Blyth and Cowpen, held last week, it was decided to obtain tenders for building a temporary hospital, suitable for small-pox cases, to accommodate about thirty patients, upon the ground offered by the Port Sanitary Authority, the cost of the building and furnishing to be defrayed by the two Councils.

MORECAMBE.—At a special meeting of the Urban District Council tenders for refuse destructors were produced and examined, but their further consideration was adjourned. A Committee, together with the Surveyor and Electrical Engineer, are to proceed to Stretford, Manchester, and Bury, or Birkenhead, to inspect the refuse destructors in use at those places.

LONDON.—The first of a course of lectures on public health was given on Tuesday afternoon, the 22nd ult., in the Lecture-room of the National Health Society, Berners-street, W. The lecturer, Miss Alice Ravenhill, spoke of the meaning of public health and the necessity of laws to guard it. She explained the scheme of English Local Government, with special reference to the laws dealing with infectious diseases, vaccination, &c.

BIRMINGHAM.—The work of cleansing the courts in the city is proceeding very satisfactorily, and at the present rate of progress it will not be very long before we are without a single dirty court in Birmingham. At no other time in the history of court life has it been possible to say as much; but the power possessed by the Corporation having been once invoked, the people are not likely to be allowed to relapse into the state of filth which, in too many cases, has been a disgrace to modern civilisation.

DOUGLAS.—The Water Committee of the Town Council has under private consideration the report of Mr. George H. Hill, Water Engineer, just received, on a scheme of increased water supply for the town of Douglas. Kerrowdhoo, the last reservoir of the company, with a storage capacity for about 25,000,000 gallons, was completed about five years ago. Mr. Daniel Cregeen, the Manx engineer, at that time advised a larger scheme at Ingebreck. Mr. Hill's report is for a new reservoir in West Baldwin at a point lower on the river than Ingebreck, having an area of about twenty-five acres, and to contain 300,000,000 gallons. The reservoir must be this size if compensation water is to be provided for mill works in Douglas river, and the cost will be £50,000, but if compensation is given in money instead of water, a reservoir with a capacity for 180,000,000 gallons will be sufficient, and will cost about £8000 less.

Personal.

MR. W. HULME has been appointed Vaccination Officer for the union of Worcester.

MR. FRED. RAYNER has been appointed Surveyor for the urban district of Newhaven.

DR. MATTHEWS has been re-elected Medical Officer for the rural district of Machynlleth.

MR. J. D. LLOYD has been appointed Medical Officer of Health for the rural district of Chirk.

MR. HOBBLING, of Hartland, has been elected Medical Officer for the rural district of Bideford.

MR. R. CLEMENTS has been appointed Surveyor and Inspector for the urban district of Barkisland.

MR. R. W. J. EWART has been appointed Medical Officer of Health for the urban district of Masham.

MR. H. B. WOODCOCK has been appointed Assistant Medical Officer of the Salford union infirmary.

MR. G. WIGNALL has been reappointed Assistant Surveyor for Loughborough, at a salary of £50 per annum.

MR. JASON C. WILSON has been appointed Sanitary Inspector to the Vestry of St. Mary, Newington.

MR. JOHN E. H. DE KEY has been appointed Inspector of Nuisances for the urban district of Wellingborough.

DR. PRATT, Appledore, has been appointed Medical Officer for Northam in succession to Dr. Rouse, deceased.

DR. PAYNE has been reappointed Medical Officer for the parish of Farcet, under the Peterborough Board of Guardians.

MR. JOHN WARD, of Wratislaw, deputy city engineer and surveyor of Sheffield, has been appointed Borough Surveyor for Derby.

MR. D. H. W. POWELL, the Surveyor of the Kingswood District Council, has resigned owing to his having obtained an appointment in the western district of Wadney, Oxfordshire.

MR. GEORGE GREEN, recently Assistant Surveyor to the Islington Vestry, has been appointed Surveyor to the parish of St. Martin-in-the-Fields, in succession to Mr. Charles Mason, who resigned his appointment.

DR. THOMAS OLIVER, M.D., F.R.C.P. (Lond.), of Newcastle-upon-Tyne, has been appointed by the Home Secretary to represent the Home-office at the International Congress on Hygiene to be held in Madrid in April next.

Lighting.

PLANS, &c., are being prepared for extensions and improvements at the gasworks in Dundee. The additions proposed to be made to the Convalescent Home are estimated to cost close on £4000. The Harbour Trustees have agreed to secure a new dredger, and to effect various repairs and improvements to their existing dredging plant at a total cost of £9290.

LEITH Corporation has received the sanction of the Dean of Guild Court to erect electric lighting station buildings off Great Junction-street.

THE Dudley Town Council has decided to adopt the recommendations of a Committee as to the tramway and electric lighting schemes for the town.

THE Hammersmith Vestry has sanctioned the application of the Electric Lighting Committee for a loan of £31,000 to extend the electric lighting works.

THE City Council of Exeter has decided to apply to the Local Government Board for permission to borrow £7000 for additional plant and cables for electric lighting purposes.

BARMOUTH is shortly to enjoy the blessing of electric light, and a movement is on foot to acquire the old reservoir at Ceilwart whereon to erect the necessary plant for the generating of electricity.

THE Gas Consumers' Protection League has decided to raise a fund for the purpose of carrying on a vigorous agitation against the proposed increase of the price of gas by the Gas Light and Coke Company.

FOLLOWING up the action of the Vestry, the Shoreditch Board of Guardians has written to the Gas Light and Coke Company strongly protesting against the rise in the price of gas, which has excited so much indignation throughout this part of London. Strange to say, the Bethnal Green Board has taken no action in the matter.

WE understand that an inquiry is being made by a Committee appointed by the Home Secretary into the extent to which water gas and other gases containing a large proportion of carbon monoxide are being manufactured and used for heating, lighting, and other purposes, and the dangers which may attend such manufacture and use.

AS the Windsor Electric Light Company is desirous of tendering for the street lighting, with the permission of the Corporation, as an experiment it installed one of its lights last week at the brow of Thames-street, on the Castle side, and just opposite the Great Western Railway Station approach. The light, which is of 1500-candle power, is fixed on an iron column about twice the size of an ordinary lamp-post.

AT a recent meeting of the Lighting Sub-Committee of the Cleaning and Lighting Committee of Edinburgh Town Council it was resolved to allow the Gas Commissioners to experiment with incandescent light in Middle Meadow-walk, Drummond-street, Melville-street, Queen-street, and Lutton-Place at their own expense. The Committee also agreed to recommend that electric lighting be introduced at Calton-road, Corstorphine-road, Inverleith-row, and London-road.

NOTWITHSTANDING the growing use of the electric light, gas is year by year growing in demand. Turning back to the year 1890, it is found that the total amount of gas made by the authorised gas undertakings of the United Kingdom was 103,011,038,299 cubic feet, as compared with 127,041,603,412 cubic feet in the year 1896, which is the latest date to which the recently issued Board of Trade returns apply. That shows an increased output of 24,030,565,113 cubic feet in the six years.

A PRIVATE meeting of the Perth Gas Commission was held recently to consider a minute and recommendation of the Gasworks Committee as to the engineer to be employed on the plans and cost of the new gasworks. The Committee, it is understood, recommended the appointment of Mr. Foulis, gas engineer, Glasgow. His appointment was agreed to, and the plans of the new works and everything relative thereto will be forwarded to him for consideration as to whether they ought to be modified or whether increased borrowing powers shall be taken.

Sewerage Schemes.

[To MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

TENDERS are to be invited by the Biggleswade Council for the Arlesey sewerage scheme.

THE District Council of Benfieldside has decided upon the enlargement of the settling tanks and new filtering beds.

IT appears that claims of East and West Ayton for a drainage scheme are coming under the notice of the Scarborough Council.

THE Surveyor to the Higham Ferrars Council is preparing an amended scheme for the proposed sewerage and sewage disposal works.

THE Lee District Board of Works has decided to memorialise the London County Council as to the defective sewerage in the lower part of Charlton.

THE Adlington (Lancashire) Urban District Council has decided to make certain extensions of its sewage purification works. Mr. McCallum, of Manchester, is the engineer.

A LOCAL Government Board inquiry has been held at Swanage concerning the application of the Urban District Council to borrow a sum of £8500 for sewerage purposes. Mr. Francis Newman, the engineer, laid the plans before the Inspector and explained their details.

AT a special meeting of the West Hartlepool Corporation the drainage scheme propounded by the Borough Engineer was adopted. The scheme is to be carried out sectionally, and involves an outlay of £60,000 to £100,000.

THE recent application to the Local Government Board to sanction a scheme of drainage and sewage disposal has caused considerable interest in Keynsham, and a meeting of owners and occupiers was to be held last Monday to consider the matter of expense.

A LOCAL Government Board inquiry was held at Croydon last week into the application of the Council to borrow several sums, including £7000 for Norbury drainage; £550 for outfall sewer, South Norwood; and £500 for additional settling tank, South Norwood Farm.

THE Urban District Council of Ardsley has instructed Mr. T. S. McCullum, of Manchester, to prepare drawings, &c., for dealing with the sewage of the Measboro, Dyke and Hoyle Mill districts. The main works of the Council have already been completed by the same engineer.

THE Stactforth Rural District Council recently considered a report relative to the alleged pollution of the Tees at Stactforth; the Committee stated that there was no pollution of the river by sewage. It was decided to defer any action until the Commission appointed by the Government has reported on sewage disposal.

AT the last meeting of the Tutbury Urban District Council, Mr. W. E. Willcox, C.E., attended and read his report on the disposal of Branstone sewage. He favoured a comprehensive scheme, which he estimated to cost £2440. It was resolved that the plans be referred to the Parish Council, and that Mr. Willcox attend the same.

AT a recent meeting of the Epsom Rural District Council the Local Government Board forwarded the draft of its Provisional Order to enable the Council to put in force the compulsory powers of the Lands Clauses Acts for the purpose of acquiring, other than by agreement, certain land required for the disposal of the sewage of the parish of Cobham. The draft was approved.

THE parishioners of Newmarket are in arms against the action of the Holywell Rural District Council in providing them with a drain, and having met at a parish meeting, it was decided—first, that as many parishioners as possible should attend the next meeting of the District Council by way of protest; secondly, that the parishioners are determined not to pay any part of the expense; and, thirdly, that the drain be removed at once, it being pointed out that it drained into and polluted a pool which was used for drinking by the cattle of the farmers.

AT a recent meeting of the Swinton and Pendlebury Urban District Council it was decided to again retain the services of Mr. T. S. McCallum, of Manchester, in connection with the Pendlebury sewage works. It is proposed now to erect sludge-pressing machinery, &c. The Council's Surveyor, Mr. H. Entwistle, is also preparing an important scheme in connectlon with the separation of the surface water from the sewage.

THE Burgh Commissioners of Moffatt have adopted the Dibdin system, as reported on by Mr. Niven, C.E., Glasgow, for the purification of the town sewage before it is discharged into the river Annan. The Commissioners contemplate placing the works on the farm of Oakrigg. It is proposed to provide an installation capable of dealing with 200,000 gallons in twenty-four hours, which will necessitate an area of about 670 square yards for tank and filter accommodation. The total estimated cost of introducing this system of sewage purification is £2350.

AT a recent meeting of the Wishaw Commissioners, on the recommendation of the Sanitary Committee it was agreed to lease the fields in front of Wilson's-rows, where, owing to a large subsidence in Marshall-street, caused by underground workings, a sewage line is presently running through, and sub-let them with a provision in agreement to safeguard the Commissioners. Offers were opened for furnishing and erecting a 300-yard line of red pine troughs in connection with sewage purification at Carbarns, and that of D. and J. Nimmo, Main-street, was accepted. It was agreed to accept the tender of Thos. Crawford and Son, Wishaw, for the drainage of East Thornlie-street, and streets adjoining.

AT the last meeting of the West Riding Rivers Board the chairman of the Domestic Sewage and Solid Refuse Committee stated that a letter had been received from the Leeds Corporation explaining, in reply to a question as to the disposal of the sewage of Leeds, that their important and costly experiments in connection with bacterial treatment were not yet sufficiently complete and conclusive to enable the Committee to base upon them a general scheme. The experiments, conducted under the supervision of Mr. W. J. Dibdin, were in a way unique, for, so far as was known, they were the first experiments in bacteria beds of crude sewage containing a great variety and volume of trade effluents. Briefly, the results so far were very satisfactory in regard to the quality of the final effluent, in which fish had been living now for over two months, but at present the Committee were obliged to suspend their judgment as to the ultimate issue of the experiments.

NOTICE.—The Annual Subscription to this Journal has been raised to 12s. 6d. to all NEW Subscribers. NO ADVANCE will be made to our friends whose names were entered on our Subcription list prior to March 31st, so long as they continue to Subscribe.

Correspondence.

We do not in any way hold ourselves responsible for opinions expressed by our correspondents.

RELATIVE COST OF WORKS OF SEWAGE DISPOSAL.

(*To the Editor of* THE SANITARY RECORD.)

SIR,—The Sutton rejoinder in your issue of 11th ult. to the Exeter broadside in your issue of Feb. 18th is very interesting to experts who can balance them. To all who cannot do so Sutton's conclusion that the differences are small as compared with the glaring defects in the costly "precipitation processes in vogue," and that both Exeter and Sutton processes are a "long way ahead of any hitherto known process of sewage treatment," is the truth which should be rubbed into all the wooden heads of the country, beginning with those of the Loca Government Board. The latter having been bowled over by their inquiry at Exeter four months ago, are now taking refuge under a new Royal Commission. The old one—thirty years old now—decreed that land was the only possible filter, and this poor board—not daring to call their souls their own—have got a new commission to authorise them to say that clinker is infinitely cheaper and more efficient than land, and thus officially to sign the death warrant of the quacks and charlatans who by precipitation processes of sorts have fattened in the interim on the helpless ignorance of Local Authorities.

No greater scandal can be proven against this generation than the supineness and incapacity of "the powers that be" in dealing with the problem of sewage disposal.

However, that is by the way; the real issue between the two new processes is far simpler than appears from the correspondence cited. It resolves itself into two parts, viz.:—Covered tank *v.* open coarse filter, and automatic gear *v.* labour, to secure intermittent use of the final filters which are common to both processes. On the first point the covering of the tank is an extra which may be of the simplest kind—it is neither necessary nor desirable to make the tank *air* tight. The exclusion of rain, dust, leaves, &c., and protection from frost is all that is required to secure bacterial liquefaction of sewage solids. That simple cover dispenses with screens, and the daily clearing of screens, which is a horrid nuisance in private installations (have known a man resign his post rather than do it), and it dispenses also with the distributing channels, and the clearing of them in and the trenching of coarse filters. That the covered tank requires no fall is an important advantage too. To my mind it is absurd to compare a covered tank which works practically *without* attention with screens and a channelled filter which would choke if neglected for a day; and Dibdin has greatly wronged himself in not frankly recognising the immense superiority of the liquefying tank over the liquefying filter as regards cost of construction plus maintenance, assuming that their effluents are equally good. Probably he felt himself driven to devise some means of utilising the liquefying bacteria without royalty, but he might fairly question the claim for royalty on such tanks. I know of many that were constructed long before the septic was heard of.

Small water-tight covered cesspools—liquefying solids perennially without attention from year's end to year's end—that is the whole matter. Notwithstanding this, for having so gallantly fought and won the public battle, having slain the chemical precipitator, and delivered the country from the sludge incubus, Cameron has fairly earned a baronetcy and a grant of public money adequate to duly maintain the honour.

He should also be empowered to nominate for knighthood, say, a dozen of the Exeter folks who have supported him in the battle.

At such price the services already rendered to the public would be undeniably cheap. Further, he should be appointed Chief of the Engineering Department of the Local Government Board, which in turn should be impeached for criminal neglect of duty. Dibdin, too, should be baronetised for his nitrifying beds on the Thames.

We now come to the only other point at issue, viz., automatic gear *v.* labour to secure intermittent use of the final filters.

The gear is good, and it will pay to pay any royalty for it which is less than the cost of labour for hand intermission, until a continuous filter crops up and dispenses with both, but it is ridiculous for the patentees to base the royalty on the cost of the tank and filters; *first*, because that varies greatly—boarded *v.* cement cover for tank—filter capacity (or quality of effluent) varying with outfall, which may well double or treble the cost of the same set of gearing for two places; and *second*, because neither tank nor filters are subject to royalty if I am right.

Let the gear be put up in sets to suit varying numbers of filters, and be charged at twice or thrice the cost, then they will be introduced everywhere. No doubt the patentees will be content with this if the Government recognises and recompenses their services to the commonwealth as above indicated. —Yours faithfully, SANITAS.

SEWAGE PURIFICATION.

SIR,—Mr. Howatson's letter in your issue of March 25th on this subject is another illustration of the all-absorbing interest which is taken in the subject of sewage purification. It is interesting to observe that independent experiments are being conducted by so many workers at the same time, and your readers will welcome the publication of the details and results of his systen.

There are some points raised in his letter which are, however, open to considerable controversy. For instance, we are assured in paragraph 3 that "chemical treatment for sewage purification can be applied in every case, and if properly carried out no system can cope with it as to results obtained." May I ask if Mr. Howatson will oblige your readers with any single instance where sewage is purified efficiently by chemical treatment? No English engineer, I fancy, would acquiesce in the reliability of such a statement, for the failure of the chemical treatment *per se* to efficiently purify sewage to meet the requirements of the County Council is generally acknowledged to be beyond dispute.

"The only bugbear is the sludge." Mark the word ONLY in capital letters, please. Mr. Howatson, like so many enthusiastic patentees who have preceded him, is going to prove, he tells us, that sludge can be made a marketable article, and be sold at a price in any case sufficient to cover all the working expenses of the sewage treatment.

One sincerely hopes that he will do so; but I might suggest, it would be prudent of him in proposing this scheme that he does not stake his reputation and also his purse, as he tells us engineers have to do in proposing any scheme in France.

Concerning his proposal to heat the air around and over sewage filters, let me remind him that this is a method already adopted by Colonel Ducat for his filter at Hendon. It is doubtless good in theory, but in practice is open to much objection, and would break down in working. Imagine what would be required to heat the filters for towns such as Manchester or Leeds with twenty or thirty acres of bacteria filters!

No. If bacteria filters require treating as invalids, it would be well to commence, in orthodox fashion, with a proper diet, and give the bacteria a supply of blankets and beef tea. The suggestion of applying heat is out of the question, and we had better devote our energies to experiments likely to be more productive of good.

It has yet to be proved that bacteria filters fail to act efficiently in winter. What is required to be known is what kind of material and what method of construction as applied to them is likely to produce the best results. That system will, it may safely be predicted, find most favour which is devoid of artificial aids and of machinery.—Yours faithfully, ENGINEER.

LONDON DRAINS.

SIR,—On all sides one hears of the great amount of measles and other illnesses about. I refer to London. I think I can give a reason, and that is, that in London our drains are insufficiently and ineffectually flushed. Probably a good storm of rain or two would give these a good cleansing; but how long its beneficial effect would remain is another question.

At present our sewers are not flushed on the top, and only partially on the sides, while the force of water is insufficient to wash off the accumulations which render them dangerous to health. This washing can be done thoroughly by using but one-tenth of the water now recklessly poured down our drains (without flushing force).

There is only one way to do it, and the sooner the Local Authorities take it to heart the better. A valued and skilled surveyor—I refer to the late Mr. Walker, of St. Martin's parish—I believe stated this repeatedly:—"The most efficient flushing is by either a fixed or temporary pipe placed in the sewers and connected to the street water force, thus washing with such power that every part of the drain is effectually cleansed." Mr. Walker's opinion was that the dry and unwashed upper parts of the drains were more disease-spreading than any other.

If one wants to put out a fire in a building, one would not pour water on the floor, but would attack the burning mass with jets of water. Drain fever germs want the same treatment. When this is given, and not till then, will be cut away the root of disease germs so freely spread in the atmosphere through vent-holes and ventilators.

Many borough and district surveyors would be glad to see more efficient means of drain flushing

provided, and many Local Authorities would like to expend funds in the adoption of the new system, but public opinion requires to be educated in the matter.—Yours faithfully,

J. C. MERRYWEATHER.

Greenwich-road, S.E., March 24th.

NOTE.—A letter from Mr. C. Chambers Smith, in reply to Messrs. Cameron, Commin, and Marten, is unavoidably held over until our next issue.—ED. S. R.

Law Cases.

A SANITARY AUTHORITY FINED.

THE Farnborough Urban Council were summoned at Aldershot by Messrs. Hannah Dever, Colonel Antonio S. Ralli, Lieut.-Colonel Watson, and Major Hippisley, for neglecting their duty as a Sanitary Authority. The case for the prosecution was that having undertaken the duty of cleansing cesspits in part of their district, they were liable to a penalty of 5s. a day in each case of neglect to do so.

The Bench found that the Council had failed to carry out their undertaking, and in one case inflicted penalties and costs amounting to £5.

IMPORTANT TO LOCAL AUTHORITIES.

THE case of Harrop and others *v.* the Mayor and Corporation of Ossett was a *quia timet* action based on private nuisance. The plaintiffs, who were the trustees of an estate and also the owners of a shoddy warehouse and factory, claimed an injunction restraining the defendants from using a hospital as a small-pox hospital. The hospital was a small one, having room for some eight patients. As yet only one small-pox patient had been received there. The hospital was some 250 yards distant from a valuable mansion belonging to the plaintiffs, 100 yards from the privies of the factory and about the same distance from the warehouse, and about 170 from a dwelling-house, occupied by its owner. A 6ft. wall enclosing an open space of 40ft. surrounded the hospital. The plaintiffs raised no objection to the hospital being used for infectious or contagious diseases other than small-pox. Their principal contention was that any small-pox hospital must be necessarily a source of danger to persons in its neighbourhood, because that disease was disseminated, *inter alia*, by air-borne infection or what was called aërial convection. Numerous members of the medical profession were called, who stated their views on this much-vexed question. The medical officers of Sheffield, Leicester, and Bradford stated that they had become converts to the theory from their actual experience. The plaintiffs, in their reply, submitted that whether the theory of aërial convection was sound or not, the evidence showed that a small-pox hospital was in fact undoubtedly a source of danger to its neighbourhood.

Mr. Macmorran, Q.C., and Mr. O. Leigh Clare, appeared for the plaintiffs; and Mr. Cozens-Hardy, Q.C., and Mr. J. G. Wood for the defendants.

Mr. JUSTICE ROMER said that the principles applicable to claims for relief in *quia timet* actions were well known. In order to sustain such an action the plaintiffs must establish a strongly or extremely probable case that the apprehended mischief must arise. The evidence here was most conflicting, and he did not intend to weigh one side against the other. He could only say that, to his mind, the short result was that the plaintiffs had not established a case entitling them to an injunction. He should give no opinion about the point about which the experts differed so much—namely, the aërial convection of small-pox. All that he should say was that on the balance of testimony a small-pox hospital might be a source of danger if badly conducted, and further he thought that where a small-pox hospital was established there was a tendency for cases to arise in its immediate neighbourhood, especially when the hospital was large and its neighbourhood crowded and ill-ventilated. But he was not satisfied that when such a hospital was well conducted it was such a substantial source of danger as to constitute it a legal nuisance, and it was certainly not so when the hospital was one like the present—a small one. Taking into consideration the small size of this hospital, its situation, and general nature, he was not satisfied that it would be such a substantial source of danger as would justify the granting of an injunction. Moreover, for several years previously there had actually been a small-pox hospital in the immediate neighbourhood, and no ill result had ever flowed from it, either to the plaintiffs or others. It was said that the hospital might prove a source of danger when the plaintiffs' land was built upon. It was not necessary to deal with that until the case arose. He was satisfied that, to persons using the land in its present state, there was no substantial source of danger. He also thought there was no source of danger from drainage. All the witnesses, moreover, agreed that vaccination offered complete protection, and he thought that the Court should consider that by taking such reasonable precautions the plaintiffs and others in the neighbourhood could protect themselves. The case, moreover, was not one of public nuisance but of private nuisance. He therefore dismissed the action with costs.

The defendants asked for an order for solicitor and client costs under the Public Authorities Protection Act, 1893.

His LORDSHIP, after a full argument, held that under the Act he had no discretion, and that the defendants were entitled to solicitor and client costs, and made an order accordingly.

THE question of the reasonableness of a bye-law made by the Kent County Council as to singing or playing of instruments in the streets within fifty yards of occupied houses, was again before the Law Courts on Tuesday. The Judges, the Lord Chief Justice and Mr. Justice Mathew differed, the former holding the bye-law to be good, and the other declaring it to be *ultra vires*. The conviction in one case accordingly formally stands; but it was resolved, owing to the divergence of views, and as there was no appeal, that a second case should stand over and be argued before five Judges.

Notes and Queries.

Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C.

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

1009.—GULLY TRAPS AND DISHES: SOIL PIPES: SUGGESTED IMPROVEMENTS.—"H. S. H." writes:—"I enclose sketches showing (1) air-tight lid, with slot and screw fastening, to be fixed in a vertical soil pipe, immediately above the junction of soil pipe, with vertical shaft, so as to save the trouble of getting to the top of a very high shaft when applying the smoke test; (2) a gully with detachable dish, so that the gully can be turned in any direction to meet the drain, while the top can remain square against the wall. This dish, left open on one side—*i.e.*, without rim—can be made up with brickwork to get the necessary 18in. from the waste pipe to the gully. I also show an inspection cap on the last pipe of the drain, adjacent to gully, for cleaning out the last joint. What I wish to know is, the names of makers of such appliances; or, if they are not manufactured, could you reproduce the sketches, so as to open the eyes of some makers to the necessity of manufacturing such? I also find a difficulty in getting builders to use syphons with necessary fall in themselves. Many makers pay no attention to this."

Answer.—Our correspondent is to be complimented on the conception of the ideas which he has put in concrete form to us. The improvements to the gully trap and dish have, however, been anticipated by makers for a considerable period, and may be obtained from the following firms, viz.:—The Albion Clay Company, Limited, 18, New Bridge-street, London, E.C.; Bugler and Co., Alpha Works, Putney, S.W.; Sankey and Son, Canning Town, London, E.; J. Place and Sons, Limited, Darwen, Lancashire; Young and Marten, Caledonian Works, Stratford, London; G. Skey and Co., Limited, Tamworth; Shanks and Co., Tubal Works, Barrhead, near Glasgow; Twyfords, Limited, Cliffe Vale Potteries, Hanley; Doulton and Co., Limited, Lambeth, London; Leeds Fireclay Company, 20, Park-row, Leeds. It would be inadvisable to plug the ventilating soil pipe immediately above the junction of the water-closet, even when there is a considerable length of shaft above such junction without another connection, as the purpose of the smoke test is to discover whether there are any bad joints in the drain and soil pipe below the roof. The consequence of blocking the soil pipe immediately above the water-closet junction would therefore be improper and constitute an imperfect test. There should be no difficulty in obtaining syphons which require a fall between the inlet and outlet. Any of the firms named will be able to supply such.

1010.—BUILDING BYE-LAWS: MODE OF CARRYING JOISTS IN WALLS.—"S. M." writes:—"Would you please give sketch showing method of carrying trimmer joists, floor joists, skirting boards, and purlins, to comply with the requirements of the Model Bye-laws Nos. 31 and 32, the former of which prohibits any timber being fixed in party walls, and the latter prohibits any joist being placed nearer than 4½in. from the centre line of a party wall?"

Answer.—The object of these two clauses, Nos. 31 and 32, of the Model Bye-laws as to New Buildings is to prohibit the insertion of all unnecessary timber and woodwork in party walls, and thus prevent the spread of fire from house to house. Hoop iron is recommended as an excellent substitute for bond timber, and can be used where requisite in a party wall, either for bonding purposes or instead of a wood plate. A double tier of hoop iron makes an excellent hold for the nails used in fixing wood grounds for skirtings and other woodwork, as wooden plugs, &c., are prohibited in party walls. Inasmuch as under Clause 32 joists may not be placed nearer to the centre of a 9in. wall than 4½in., it follows that joists, beams, &c., cannot properly be inserted in such a wall. Under these circumstances joists should be laid parallel with the party wall, their ends resting on the external front and rear walls, or on some internal wall of the building, and such trimming joists and other timbers as must be laid at a right angle to the party wall should be laid on a proper corbel, or on a wood plate resting on two or three courses of brickwork properly corbelled out, or on suitable iron brackets built into the walls.

1011.—INSUFFICIENT SEWERS: COMPLAINT AS TO. "W. M." writes:—"Some twenty years ago A sold four blocks of land, as per rough sketch [not reproduced], and allowed the main drains therefrom to discharge on the fields belonging to him, and lying near thereto. A now complains to the Sanitary Authority of the damage resulting from the sewage as applied to his fields, and requests the Sanitary Authority to provide sewers and dispose of the sewage. Can he do so?"

Answer.—Unless it can be shown that the sewage as at present discharged is a nuisance or injurious to health to the occupants of the houses, the Sanitary Authority may disregard his complaint. A's only remedy is to make complaint under Sec. 299 of the Public Health Act, 1875, to the Local Government Board; but unless it can be shown that injury to health is liable to be caused by the continuance of the existing system, the Board will most probably not interfere. It appears to us that the owners of the houses have acquired an easement for the drains in A's property.

1012.—SANITARY INSTITUTE EXAMS: FEES CHARGED.—"T. G." writes:—"Would you please inform me what fee is charged to candidates by the Sanitary Institute for the examination for Sanitary Inspectors?"

Answer.—The fee payable for the examination for Sanitary Inspectors (and also for the examination in Practical Sanitary Science), when the examination is held in London, is £3 3s., but when the examination is held in a provincial town £1 1s. extra (or a total fee of £4 4s.) is charged to the candidate in order to cover the expenses incurred in holding an examination out of London.

1013.—MILK: TAKING SAMPLES FOR ANALYSIS.—"P. K. S." writes:—"In taking samples of milk for analysis, must it be purchased in all cases and be divided into three parts?"

Answer.—We are of opinion that it is necessary under the Sale of Food and Drugs Acts, 1875 and 1879, when obtaining samples of milk under Secs. 13 or 14 of the former Act, and Sec. 3 of the later Act, that a public officer, or his assistant agent or deputy, must purchase such samples. The purchaser is also required under Section 14 of the Act of 1875 to forthwith, after purchase, notify to the seller or his agent selling the article his intention to have the same analysed by the public analyst, and shall offer to divide the article into three parts, to be then and there separated, and each part to be marked and sealed or fastened up in such a manner as its nature will permit, and shall if required to do so proceed accordingly, and shall deliver one of the parts to the seller or his agent. He shall afterwards retain one of the said parts for future comparison, and submit the third part, if he deems it right to have the article analysed, to the analyst. If the offer to divide into three parts is not accepted, the analyst, as provided by Sec. 15, is required to divide the article into two parts, one for analysis and the other to be returned to the purchaser. If the procedure be taken under Sec. 3 of the Sale of Food and Drugs Amendment Act, 1879, it will

not be necessary to announce to the seller his intention of having it analysed, nor to offer to divide it into three parts. Inspectors under the Acts should obtain Bell and Scrivener's "Sale of Food and Drugs Acts," price 4s. 6d., and procurable from the Sanitary Publishing Company. It should not be overlooked that an Inspector of Nuisances may seize milk exposed or deposited in any place for sale under Sec. 116 of the Public Health Act, 1875, if such milk is intended for the food of man, and if it appear to be unwholesome or unfit for the food of man, he may carry away the same to have it dealt with and condemned by a justice.

1014.—MEASLES: TRANSMISSIBILITY OF THE DISEASE.—"Measles" writes:—"Will you please refer me to any reliable information to the effect that the contagion of measles can be retained by bedding, clothing, carpets, walls, floors, or any other thing capable of being raised to the temperature of 212 deg. Fah., or limewashed or similarly treated?"

Answer.—It is generally acknowledged that the bacteriology of measles has not yet been systematically investigated, and it is rather from analogy than from experiment that it may be considered to be dependent on the specific microbe. The *materies morbi* is in the expectoration and in the cutaneous *débris*. It does not appear to be known whether the other excreta are infectious. We know of no experiments which have been conducted to test the transmissibility of measles by clothing, bedding, &c. It does not appear, however, to be transmitted by drinking water, milk, or other food. Our correspondent will probably find the paper read by Dr. Kenwood on "The Notification of Measles," which appeared in the *Sanitary Institute Journal* for July, 1897, useful, as well as the controversial papers on the same subject which appeared in THE SANITARY RECORD in the volume January to July, 1897.

1015.—MARGARINE ACT, 1887: SAMPLE NEED NOT BE PURCHASED.—"S. P." writes:—"Under Sec. 10 Margarine Act, must the sample of butter or article not marked margarine be divided into three parts, and can it be taken without paying for it?"

Answer.—Yes. Sec. 10 of the Margarine Act, 1887, provides that any officer authorised to take samples under the Sale of Food and Drugs Act, 1875, may *without going through the form of purchase provided by that Act*, but otherwise acting in all respects in accordance with the provisions of the said Act as to dealing with samples, take for the purposes of analysis samples of any butter or substances purporting to be butter which are exposed for sale and are not marked margarine as provided by this Act, and any such substance not being so marked shall be presumed to be exposed for sale as butter. The purchaser must offer to divide the sample into three parts, and immediately after purchase notify to the seller his intention of having it analysed by the public analyst.

1016.—SHOP HOURS ACT INSPECTORS: QUALIFICATIONS.—"T. H." writes:—"I should esteem it a favour if you could give me an idea as to what the qualifications are for the post of 'Shop Hours Act Inspector.'"

Answer.—Candidates for such an office, are usually required to produce some evidence of their sanitary knowledge and of an acquaintance with the Public Health Acts, which evidence has to be substantiated by the possession of the Certificate of Inspector of Nuisances from the Sanitary Institute. We are not aware that any other special qualifications are required.

1017.—HOUSING OF THE WORKING CLASSES ACT, 1890: URBAN AUTHORITY MAY ERECT COTTAGES FOR THE WORKING CLASSES.—"W. H. C." writes:—"A member of my Council has given notice of motion for the erection by the Council of workmen's cottages. Will you kindly inform me what powers an Urban Authority have to do this? Under the Housing of the Working Classes Act it would be necessary for the Medical Officer of Health to condemn an unhealthy area before the Council would have power to build, and in our case this could not be done. Therefore, if there is no other Act but the above, I take it that the Council cannot move in the matter."

Answer.—If the Urban Authority pass a resolution formally adopting (if they have not already done so) Part 3 of the Housing of the Working Classes Act, 1890, they will be enabled, under Sec. 59 of the Act, to "erect, on any land acquired or appropriated by them, any buildings suitable for lodging-houses for the working classes, and convert any buildings into lodging-houses for the working-classes, and may alter, enlarge, repair, and improve the same respectively, and fit up, furnish, and supply the same respectively with all requisite furniture, fittings, and conveniences." It may be observed that the expression "lodging-houses for the working classes" includes, as defined by Sec. 53, separate houses or cottages for the working classes, whether containing one or several tenements, and the purposes of the third part of the Act are to include the provision of such houses and cottages. Our correspondent is therefore in error in his interpretation of the provisions of the Act.

1018.—WORKSHOP INSPECTORS: DUTIES OF.—"Subscriber" writes:—"Will you kindly enumerate the duties of an Inspector of Workships, &c., under a Sanitary Authority, and under what Acts he will perform such duties? Any other information will oblige."

Answer.—We have not space to enumerate the duties of a Workshop or Shop Hours Inspector in this column. Our correspondent is, however, recommended to procure "Notes on the Factory and Workshop Acts, 1878, 1891, and 1895," price 4d., post free, from the Sanitary Publishing Company, wherein he will find in a concise form, arranged by Dr. Davies, an abstract of "Sanitary Provisions to be Administered by the Medical Officer of Health's Department." From this he will be able to obtain a general idea of the supervision which an Inspector of a Sanitary Authority has to exercise over such buildings. If he requires a full copy of the Acts, with annotations, he should procure "Redgrave's Factory Acts," price 6s., obtainable from the Sanitary Publishing Company. We may point out that the appointment of Inspectors under the Shop Hours Acts is entrusted by Sec. 8 of the Shop Hours Act, 1892, to the Council of any county or borough, and in the City of London to the Common Council.

1019.—COMBINED DRAINAGE: DRAIN OR SEWER.—"A. M. H." writes:—"What powers have an Urban Sanitary Authority to deal with the reconstruction of combined drains, as in the two following cases, viz., (1) where eleven houses, all belonging to different owners, drain into a common drain in a private passage; (2) where two houses drain into a common drain, which before entering upon the public road passes through a private garden? The two houses belong to one owner. Sketches submitted herewith.

Answer.—The sketches submitted are not so clear as is necessary. We are not able to gather whether the houses are within the same curtilage. Assuming, however, that they are, and, further, that the Public Health Acts Amendment Act, 1890, has been adopted in the district, and that the combined drain is on private premises, notice may be served on the owners to carry out any works which may be necessary thereto to abate a nuisance arising therefrom. The three leading cases upon the subject as to what is (1) a drain, and (2) a sewer, are (*a*) Vestry of St. Martin's-in-the-Fields *v.* Bird (60 J.P., 52), where it was decided that buildings forming an arcade, and described as the Lowther Arcade, were not premises within the same curtilage, but that each shop was a separate building and had its own curtilage, and that the drain common to all the buildings was a sewer;

and (*b*) Pilbrow *v.* Vestry of St. Leonard, Shoreditch (59 J.P., 68), where two blocks of buildings, let as forty-six tenements, were separated from each other by a narrow causeway or yard, to which the occupants of both buildings had access, but it was not a thoroughfare. It was held that the two blocks of buildings were for the purposes of the section "one building," and that they were within the same curtilage, and the combined drain was not a sewer for which the Authority were liable for repairing. (*c*) Seal *v.* Merthyr Tydfil Urban District Council (66 J.P., 55), where at the back of one side of a new street a drain was made, commencing at one end of the street, and running at the back of the houses through the gardens until it reached the public sewer. The houses belonged to different owners, and each house was connected with this drain, which was a drain for those particular houses, and for no other premises, and was not a general drain into which any houses could be drained. Held that the drain—being a drain constructed on private ground to which the public had no access—was a single private drain within Sec. 19 of the Public Health Act, 1890, and that the owners were liable to abate nuisances in such drain. In (2) we think that if the houses are in the same curtilage, or that the conditions are similar to those in Seal *v.* Merthyr Tydfil Council, the owner will be liable to abate any nuisance arising from the drain. In both cases notices should be served under Sec. 19 of the Act of 1890.

1020.—Sanitary Inspectorships: Qualifications.—"J. O." writes:—"(1) Do the public bodies who appoint Inspectors of Nuisances impose on candidates any restrictions as to height, age, and previous occupation? (2) My age is twenty-nine. Could I, if I gained the certificate of a Sanitary Institute, be eligible as a candidate for a Sanitary Inspectorship at a salary of £120 a year, provided that my health, character, and testimonials were satisfactory? Or must a man depend on 'influence' if he is to get a good appointment?"

Answer.—(1) Local Authorities usually stipulate that candidates for Sanitary Inspectorships must not be over forty or forty-five years of age. A person under twenty-one years of age would not be approved by the Local Government Board. There is no restriction as to height, nor as to previous occupation, although a candidate who is unable to show by his previous occupation that he has a practical knowledge of the work which he may have to superintend on becoming an Inspector, will not have such a favourable chance of being selected as those who are acting Inspectors or are practically acquainted with the building trade in some one or other of its branches. (2) Our correspondent would be eligible as a candidate, but it would be extremely doubtful whether, without having any practical experience, he would ever be selected to fill a position at a commencing salary of £120. He might obtain a position as Assistant Inspector at a lower salary, and ultimately, if he became a capable officer, obtain a position at a higher salary. There is always a plethora of candidates for any vacancy for an Inspector of Nuisances. A candidate must not depend on influence alone securing him an appointment. It is, no doubt, of great assistance, but he must be able to produce strong evidence of his fitness and qualification for the post.

1021.—Sewer or Drain: What is a?—"E. M." writes:—"An owner has been served with notice to reconstruct a drain which receives the drainage of two houses. I have advised him that it is the duty of the Sanitary Authority to repair all sewers, and under the Public Health Act, 1875, the drain in question would be a sewer in my opinion. Is not this so? Would it be worth while the owner contesting the matter with the Sanitary Authority to secure the reconstruction of the sewer or drain by the Sanitary Authority? I may add that both houses belong to the same owner."

Answer.—The decisions on the point as to what is a drain and what is a sewer are very conflicting. We are, moreover, not informed whether the district is under the Metropolis Management Acts, on under the Public Health Act, 1875. Briefly a "drain" means any drain of and used for the drainage of one building only or premises within the same curtilage, and a "sewer" is a drain receiving the drainage of two or more houses which are not within the same curtilage. If the houses are not within the same curtilage in this instance the owner might inform the Local Authority that the duty of relaying the drain is a duty which belongs to them, inasmuch as it is a sewer.

1022.—Crown Property: Duchy of Lancaster: Nuisances: Powers of Local Authority.—"A. J. M." writes:—"Will you please inform me whether the provisions of the Public Health Act, 1875, in respect to the drainage of existing buildings and abatement of nuisances apply to premises belonging to the Duchy of Lancaster, and can be enforced against them, the same as to those belonging to private individuals, or whether they are exempt?"

Answer.—Crown property such as that referred to is not specially exempted from the operation of the Act. Assuming however, that the property is in the occupation of the Crown, no compulsion by virtue of the Act can be put upon the Crown as occupier or owner. The provisions of Sec. 327, Sub-sec. 2, of the Public Health Act, 1875, as to exemption of Admiralty property and War-office property, must not be overlooked. According to the general rule of construction, the Crown is not bound by the statute, except so far as it is expressed to be so. But this rule, however, does not extend to exempting all Crown property from the operation of the Act. As we have already pointed out, if the property is in the occupation of the Crown, the Sanitary Authority

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cannot interfere. On the other hand, if it is not in such occupation, the Authority may proceed in the ordinary manner.

1023.—COMMON LODGING-HOUSES: BYE-LAWS TO BE MADE BY LOCAL AUTHORITY.—"J. S." writes:—"Will you please inform me whether a Local Authority have power to make regulations for common lodging-houses without adopting the Model Bye-laws for all purposes? As I read Sec. 80 of the Act of 1875 I have the impression that the Council have power to make regulations."

Answer.—A Local Authority are not enabled to make regulations in respect to common lodging-houses but they are required to make bye-laws, the duty being compulsory, not optional, and a neglect to do so is a default to enforce the provisions of the Public Health Act, 1875. Model Bye-laws as to common lodging-houses have been issued by the Local Government Board, and copies may be obtained from them or from Messrs. Knight and Co., 90, Fleet-street, E.C. The Local Government Board do not permit much variation from the Model Bye-laws issued by them. In framing new bye-laws considerable assistance will be obtained from Knight's "Annotated Edition of Model Bye-laws," price 12s. 6d., which should be procured.

Vacancies.

BUILDING INSPECTOR (LITHERLAND, LANCS, April 16th).—For the Urban District Council. Salary £110 per annum. Messrs. North, Kirk, and Cornett, clerks to the Council, 15, Lord-street, Liverpool.

BUILDING INSPECTOR, &C. (SCARBOROUGH, April 2nd).—For the Corporation. (1) Building inspector; salary £130 per annum. Mr. H. W. Smith, A.M.I.C.E., Town Hall, Scarborough. (2) Temporary architectural draughtsman; salary £2 2s. per week. Mr. John E. T. Graham, town clerk, Town Hall, Scarborough.

CLERK OF WORKS (PONTEFRACT, April 7th).—For the Rural District Council. Mr. Wm. A Glover, clerk, Pontefract Union Offices, Pontefract.

CLERK OF WORKS (HAM, SURREY, April 4th).—For the Urban District Council. Salary £3 3s. a week. Mr. W. Warner, Kingston-road, Ham.

ELECTRICAL ENGINEER (DEWSBURY, April 9th).—For the Corporation. Salary £250 per annum. Mr. G. Trevelyan Lee, town clerk, Town Hall, Dewsbury.

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CONGLETON (CHESHIRE).—April 2nd—14th.—Water-supply Works.—Mr. C. Russell Hall, West-street, Congleton.

BATTLE (SUSSEX).—April 4th—Drain.—Mr. Henry Card, county surveyor, County Hall, Lewes.

GLASTONBURY.—April 4th.—Sewer, &c.—The Borough Surveyor, Council Offices, Glastonbury.

PUDSEY.—April 4th.—Sewers.—Mr. J. Jones, surveyor, Council Offices, Pudsey.

EPPING (ESSEX).—April 5th.—Sewers, &c.—Mr. Edmond Egan, A.R.I.B.A., engineer to the Council, Holmdale, Loughton, Essex.

BISHOP AUCKLAND.—April 4th.—Sewers, &c.—Mr. C. Johnston, surveyor, 1, Cradock-street, Bishop Auckland.

CROMARTY (SCOTLAND).—April 4th.—Sewerage Works.—Mr. James Fraser, civil engineer, Inverness.

ABERDEEN.—April 5th.—Sewerage Works.—Surveyor's Office, Town House, Aberdeen.

JARROW.—April 5th.—Sewers.—Mr. J. Petree, borough surveyor, Jarrow.

MOORVILLE (NEAR STANWIX, CARLISLE).—April 5th.—Sewer Pipe.—Mr. Wilfrid Crosthwaite, sanitary inspector, Stanwix.

NANCY.—April 5th.—Drainage Works.—Municipal Authorities, Nancy.

HOVE (SUSSEX).—April 6th.—Sewer.—Town Surveyor, Town Hall, Hove.

POKESDOWN (NEAR BOURNEMOUTH).—April 9th.—Sewers, &c.—Mr. Edward Wembridge Ingamells, engineer and surveyor, Council Offices, Pokesdown, Bournemouth.

COMPETITIONS.

CRICKLADE (WILTS), April 30th.—Water Supply Plans.—The Cricklade and Wootton Bassett Rural District Council invite engineers to forward a report, with plans and estimates, for furnishing an effective system of water supply to the town of Cricklade, Wilts, exclusive of the cost of the land or easements, but inclusive of all other expenses. Premiums of £21 and £10 10s. will be given for the plans which the Council shall adjudge to be first and second in order of merit. Mr. Harry Bevir, clerk, Union Offices, Wootton Bassett.

FORMBY (LANCS), July 1st.—Sewerage Scheme.—The Formby Parochial Committee invite competitive schemes for the sewerage of a portion of the township of Formby. Premiums are offered amounting to £100 for the scheme considered first in order of merit, £50 for the second, and £25 for the third. Mr. J. H. Havelock Sutton, Piercefield-road, Formby. A professional assessor will be appointed to adjudicate upon the plans.

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ARTICLE NO. 2.

THE VALUE OF KOLA.

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It would have been useless to attempt to decry the value of malt and hops, but the general public are probably not quite so familiar with the facts concerning Kola.

But the published evidence as to the value of Kola is so extensive and overwhelming that no medical journal of any standing would risk its reputation by denying that Kola possesses the same active principle as tea or Cocoa, or by venturing to assert that it possesses injurious properties.

Kola has several times been carefully analysed, and has been found to contain caffeine, the same active principle as tea and coffee, as well as theobromine, which is the active principle of Cocoa, and no injurious ingredient whatever. There are many people who find that Cocoa alone does not produce the same effect as tea, that it does not remove the sense of fatigue after prolonged muscular exertion, and that it does not cause the same feeling of alertness or active brain power that is produced by pure coffee.

On the other hand, in some people tea produces a feeling of nervousness and tremulousness, especially Indian or Ceylon tea, and in others coffee causes constipation. These effects are due probably to minute quantities of volatile substances present in tea and coffee. The use of Kola is not known to produce any injurious effect whatever, whilst it contains the same

active principle as tea and coffee, to which they owe their restorative properties, &c. The addition of Kola to Cocoa, therefore, improves the Cocoa by increasing its invigorating property without the corresponding disadvantages that some persons experience from the use of tea and coffee.

But this is not all. Cocoa in the pure state contains nearly half its weight of fat, which is apt to disagree with delicate stomachs, and is, therefore, generally removed by Cocoa manufacturers. But Kola contains only 1·5 per cent. of fat. On the other hand, Kola contains 42·5 per cent. of starch, but Cocoa only 14 to 18 per cent. It is, therefore, more of the nature of a food than Cocoa. Consequently, it is a valuable addition to Cocoa, whether as an invigorant or as a food.

THE USE OF MALT.

The valuable properties of malt in aiding digestion are now everywhere recognised by the medical profession, so that malt extract has become a household word. Malt contains a peculiar principle known as diastase, and which possesses the property of rendering the starch soluble, and thus converting it into a form in which it is readily absorbed, and acts as a nourishing food. This alteration in starch and starchy foods is partly performed by the saliva before digestion in a healthy body, hence the importance of well masticating all starchy food, such as bread and potatoes.

The process is subsequently completed by the pancreatic juice. But in weak states of health, in wasting diseases and consumptive patients, and in the case of busy people who bolt their food, the use of malt extract considerably aids the digestion of starchy foods, and thus increases its nourishing properties. Obviously, therefore, the addition of malt must increase the solubility of the starch present in Cocoa and in the Kola, and increases its value as a food.

THE USE OF HOPS.

In connection with ale and beer the tonic value of hops is so widely recognised by Britons and Germans all over the world as scarcely to require attention to be directed to the fact.

It may, however, be pointed out that, apart from their use in alcoholic liquors and beverages, hops have a distinctly beneficial action of their own.

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NOTICE.—The Annual Subscription to this Journal has been raised to 12s. 6d. to all NEW Subscribers. NO ADVANCE will be made to our friends whose names were entered on our Subscription list prior to March 31st, so long as they continue to subscribe.

THE

Sanitary Record,

APRIL 8, 1898.

Notes.

Recovery of Tolls under Markets and Fairs Clauses Acts.

WE have from time to time been asked to advise as to the powers of a Local Authority who have adopted the Markets and Fairs Clauses Act, 1847, to recover tolls on marketable articles sold outside the precincts of a market. As bearing on the subject, a case—Ross *v.* Taylerson, decided in the Queen's Bench Divisional Court on

January 19th (62 J.P. 181)—will be found useful to many of our readers and to Local Authorities. The case was an appeal from the Justices in and for the city of Liverpool, who had convicted the appellant (Ross), on the information of Edward Taylerson (the respondent), a servant of an association of retail dealers, many of whom deal in tollable articles in a place in which the Markets and Fairs Clauses Act, 1847, apply, under Sec. 167 of the Public Health Act, 1875, and who had taken proceedings as a party aggrieved under Sec. 253 of the Act for the recovery of penalties under Sec. 13 of the Markets and Fairs Clauses Act, 1847. It appears that the appellant, not being a a licensed hawker, sold in Adelaide-street, about a quarter of a mile from his shop, in the said city of Liverpool, certain marketable articles, to wit, potatoes and vegetables, in respect of which toll was authorised to be taken in the wholesale and retail fruit and vegetable market in the said city, and for which no tolls had been demanded or paid by the Local Authority. It was contended on the part of the appellant that the Markets and Fairs Clauses Act, 1847, does not extend to the markets and fairs established in Liverpool, and that the informant was not a party aggrieved within the meaning of Sec. 253 of the Public Health Act, 1875 (under which proceedings for a recovery of penalties may be instituted either by a Local Authority or a party aggrieved). These objections were both over-ruled, and the conviction of the magistrates was affirmed.

The Inspection of Private Schools.

An important question was raised at the meeting of the St. Pancras Vestry. Very properly the Health Committee of the Vestry had determined that the private schools in their district shall be officially inspected by the officers of the Vestry, just the same as the public institutions. Although the high-schools may be carried on for private profit, in them is gathered together a large number of young people from all parts, and it is the duty of the Authorities to see that the conditions prevailing are such as will promote and ensure their health and well-being. Acting on the instructions of the Committee, the female Sanitary Inspector sought admission to the North London Collegiate and Camden School for Girls, Sandall-road, but entrance was refused; and the Clerk of the Governors intimated that admission would not be granted except it be ordered by the High Courts of Justice. The Health Committee reported this fact to the Vestry, also stating that the solicitor held that the Committee had no alternative but to enforce the Vestry's statutory powers by legal proceedings, and that counsel had been retained to represent the Vestry in any legal proceedings.

The Folly of Refusal.

We regret that the managers of so important a school should have acted so unwisely as to refuse to have their premises inspected. The request from the Vestry cast no aspersion upon their institution. In fact, several of the members spoke from personal knowledge of its high character and good conduct. But public bodies cannot take such things for granted, and invidious distinctions cannot be made. But why should entrance be refused? If all is as it should be, the Governors have everything to gain and nothing to lose by admitting the Inspector. A certificate from a professional man is good in itself, but it must be borne in mind that he is called in to certify a certain thing, and the bias of his report is bound to be in the direction of what is wanted. But it would be infinitely better to be able to publish a guarantee from the Local Authority that every precaution was taken to ensure the perfect sanitation of the school premises and their surroundings. We trust, therefore, that wiser counsels will prevail, and that the Vestry will not have to take the threatened proceedings. The Governors will, we believe, lose the day, and in all probability have to pay dearly for their unwise refusal. We may state that the action of the Health Committee was heartily approved by the Vestry.

Gipsy Dislike of Sanitary Law.

The Medical Officer of Blackpool has just had a bout with a gipsy, who had pitched his tent within the borders of the district. It was found that in the encampment were children suffering from infectious disease, and the Medical Officer of Health very properly desired their removal to the Sanatorium. The father (named Boswell) declined to let the children be taken away, and resisted the order of the magistrate, notwithstanding that the doctor and Inspector had the services of the police when they attempted to enforce it. On Friday the gipsy was taken before the magistrate, and on being asked to plead, Boswell humbly begged pardon for what he had done; but the screams of his wife and children had unnerved him, and he did not know what he was doing. He was asked if he would allow his children to be taken, and he replied that there was no necessity for their removal. He argued with the magistrates, and appealed for the children not to be sent away. He would give the whole world, if he could, rather than that they should go. He was again asked, and said it would make his heart bleed to say "Yes." Being warned that he would be seriously dealt with if he did not consent, Boswell asked what the penalty would be, and was told that even if the penalty were enforced the children would still be taken. After consulting with another gipsy, Boswell consented to let the children go, and later in the day they were taken to the Sanatorium, along with the father, who will remain with them. It seems hardly credible that such ignorance should prevail to-day, and yet there are people who defend these nomads in their refusal to conform to the laws of health and safety. The history of the small-pox at Middlesbrough should be a warning to all of the danger incurred by allowing these wandering tribes to travel unmolested throughout the country.

The Pollution of Rivers.

One of the difficulties anticipated in connection with the Pollution of Rivers Prevention Bill now before Parliament is that, as the Bill does not extend to Scotland, County Councils immediately south of the Border will have an imperfect jurisdiction over streams which lie partly in Scottish territory; and the President of the Local Government Board has therefore been appealed to

to introduce a short Bill, consisting of a single clause, to enable such County Councils in England to co-operate with Scottish County Councils immediately north of the Border in the formation of joint committees for the prevention of the pollution of such streams as are subject to a divided jurisdiction. Mr. Chaplin, though declining to introduce such a Bill on behalf of the Government, has given an assurance that, in the event of one being introduced by a private member, it should receive his support; or, he suggested, a clause to the same effect might be inserted in Committee on the Rivers Pollution Prevention Bill, providing for the appointment of joint committees to meet the end in view.

The Spey Case.

An important case of river pollution has been occupying the attention of the Scotch Courts. The case is that of the Spey, and also of a small tributary called the Ringorm Burn, near Aberlour. The complainers are the Countess of Seafield and several other riparian owners; and the pollution complained of was said to be caused by the discharge of the waste products of Macallan Distillery into the river. There has been within recent years a great extension of the distillery industry (that is a fact for temperance reformers to ponder), and on Speyside in particular the industry has made great strides. The consequence is that the quite insignificant pollution which could be laid to the charge of distilleries along the river a few years ago has now grown to be an intolerable nuisance, and has proved the ruin of valuable salmon fishings. These facts have been established by the evidence which has been led at great length in the Court of Session. The offending distillery has been found "guilty," but before its work is interfered with by interdict, it has been given a chance to reform; and the case has meanwhile been stayed to allow time to test the effectiveness of certain filter beds and other remedial works designed to prevent the pollution.

A Fever Hospital Case

A pretty little fight has arisen between the Local authority of the town of Hawick and the Local authority of the Hawick District of the County, as to the liability for the expense of maintenance of a patient in the Hawick Fever Hospital. The patient belonged to the County district, and the case had been notified by the County Medical Officer, but as there was no fever hospital for the County, the patient was removed to the Hawick Hospital. In point of fact, the removal was at the instance of the patient's private medical attendant, but it was contended that as he had been detained by the County Medical Officer, who also agreed to the removal, the County should be liable. On the other hand, it was argued that the case was just the same as if a person had gone into hospital of his own free will, that the notification by the Medical Officer was merely the performance of a statutory duty, and that his approval of the removal to hospital could not constitute a ground of legal liability. The Court upheld the latter contention, though evidently not without strong sympathy for the view taken by the Burgh Local Authority. The hardship of the case for them lay in this, that it was apparently impossible to recover the expense from the patient himself, and of the two Local Authorities concerned, it seemed most fitting that the Authority for the district where the case occurred should be responsible. There was, however, no special arrangement between them, and though such an adjustment of the responsibility might seem equitable, it could not be legally enforced. It was an unfortunate instance of the friction that will occasionally arise between bodies that are really working for the same object.

The Small-pox at Middlesbrough.

We are glad to observe that the epidemic of small-pox at Middlesbrough is beginning to show some real indication of being at last on the decline. The sudden recrudescence, which was no more than was anticipated, appears to have spent itself; and the number of cases reported from day to day, though still sufficiently serious, is so perceptibly diminishing as to warrant the expectation of the Authorities that it will not now be long ere the scourge is effectually stamped out. By the end of March about 1200 cases of small-pox had been notified, and as the epidemic is by no means over yet, before we have heard the last of it this number will probably be considerably increased. Such an experience as Middlesbrough has passed through, with all its attendant loss and suffering, is enough to furnish matter for grave reflection to the veriest infidel in the benefits of sanitary administration, and the virtues of vaccination as a prophylactic.

Oysters and Typhoid Fever.

The deputation which waited on Mr. Chaplin the other day at the Local Government Board Office, to impress on him the necessity for legislation in order to check the cultivation of oysters and other shell-fish in close proximity to, or actually under discharges of sewage, or to prohibit the sale of bivalves reared in such dangerous localities, has opened the eyes of the public to a very alarming state of things. The speakers included a number of representative members of Parliament and Medical Officers, and their views are entitled to the greatest weight. Their opinions were unanimous as to the dangers connected with the present unrestricted methods of oyster cultivation, and the powerlessness of Local Authorities to deal with the matter. One and all testified to the very serious prevalence of typhoid and other forms of enteric fever due to this cause; and it was stated that Local Authorities had no means of preventing the sale of shell-fish within their districts, even though they had the clearest evidence that the consumption of such shell-fish had been the cause of enteric fever, and that they were derived from a source known to be contaminated with sewage.

The Magnitude of the Danger.

Now this is undoubtedly a very grave state of matters, and the danger is all the greater because oysters swarming with typhoid germs may appear quite sound to the naked eye. Moreover, the danger is not confined to any one class; for, if oysters are chiefly consumed by the rich, the poorer classes are great consumers of mussels, cockles, and peri-

winkles, all of which molluscs are equally exposed to contamination by sewage discharge. The consumption in London is very large, and frequently in a raw state. Completely reliable statistics can hardly yet be expected as to the rate of mortality to be attributed to this cause, but some figures were submitted which we believe are trustworthy. Dr. Nevin, of Manchester, said that one-tenth of the cases of typhoid in that city were traceable to such impregnated food; and Dr. Newsholme, Medical Officer for Brighton, stated that he had ascertained that contaminated oysters were responsible for one death out of every three from typhoid in the fashionable English watering-place.

The Position of Brighton in the Question.

The lead in the movement for legislation has been taken by Brighton, which feels that its reputation as a health resort is deeply affected. Sir John Blaker, the Mayor, said that they had been compelled to take action in consequence of the alarming report of their Medical Officer. Moreover, the report of the Medical Department of the Local Government Board in 1896 on the conditions under which oysters and other edible molluscs are cultivated on the coasts of England and Wales, proved that in many places they were liable to sewage contamination of the grossest kind, and that the consumption of shell fish derived from these sources was a serious danger to the public health. The Corporation of Brighton accordingly, on consideration of these facts, attempted to deal with the question in 1896 by private legislation; but the fact that the report of the Medical Department of the Local Government Board had not then been presented was urged by the Board of Trade as a reason for not legislating by private Bill, but by a public Bill after the result of the inquiry was made known. Brighton, however, was resolved that the matter should not rest; and Sir John stated that they had received the active support of twenty-seven large towns who were interested in the question, and a resolution had also been passed by the London County Council approving of their action.

Mr. Chaplin's Promises of Legislation.

Such a strong representation of the case, backed as it was by a body of expert opinion of the greatest weight, including Sir William Priestley and Dr. Collingridge, Medical Officer for the Port of London, could not fail to produce a deep impression on Mr. Chaplin. And that he was so impressed was evident from his reply to the deputation. He admitted the gravity of the situation, and promised to see what could be done. He added that he thought the time had arrived for legislation. The question was, however, larger than he had believed, for the danger connected with the consumption of the smaller and cheaper shell-fish was an aspect of the case that he had not considered, and inquiries would have to be made before action could be taken. But with regard to oysters, he hoped before long to adopt measures that would be satisfactory. He did not indicate what these would be, but no doubt he will give effect as far as possible to the views which were urged upon him; and these were, that Local Authorities should be empowered to prevent the sale within their districts of shell-fish from any source proved to be contaminated by sewage, that they should also be required to construct their sewage outfall works in such a manner as not to contaminate oyster beds, and that the owners of the oyster beds should be compelled to keep them at a distance from the sewers.

Vital Statistics for Scotland.

The Report of the Registrar-General on the Births, Deaths, and Marriages for Scotland in 1897 was issued the other day. As usual, a document of this nature bristles with figures; and we only extract a few, relating to the death-rate and the vaccination returns. The death-rate for Scotland in 1897 was 18·7 per 1000; the highest rate, 20·8, being recorded in the principal urban districts; and the lowest, of 16·2, in the mainland rural districts. The percentage of successful vaccinations of children, whose births were recorded, was 85·135. In 2·2 per cent. of the cases, certificates of postponement were granted; 0·421 per cent. of the cases were described as insusceptible of vaccination in consequence of some constitutional peculiarity, and 0·221 per cent. in consequence of their having been vaccinated, but by persons who were not qualified to grant certificates; 9·425 per cent. died before vaccination; and 2·598 per cent. were removed from the district in which they were born prior to vaccination, or were otherwise unaccounted for. There were seven deaths from small-pox in the eight principal towns during the year.

DIET IN THE TREATMENT OF INEBRIETY.

For a long time persons have urged that diet was the real remedy for inebriety. Yet, when it was applied in certain cases, no better results were obtained. The drink symptom remained. Occasionally the change from a meat to a grain diet, or the reverse, was followed by the subsidence of all desire for spirits. In a continuous drinker a general diet of both meats and grains appears to meet the demands of a disordered nutrition and semi-starved condition better than any special articles of food. In the periodic cases an albuminous or proteid diet is often decidedly injurious. In some cases an intense craving for meat or for starchy foods precedes the drink paroxysm, which subsides when the craze breaks out. The intimate relation between foods and the drink paroxysm is very prominent in many cases.

In some cases excessive meat eating is associated with great irritability and sensitiveness of the brain and nervous system. The change of diet is followed by a great improvement of mental activity. It would appear from a study of many cases that so far no general rule can be found, and each case must be studied from the facts of its history. Thus, in some cases a meat diet is literally poisonous, and its removal is the first essential for a cure. Again, a grain or fruit diet is clearly injurious, and more rapid recovery follows a change. In all cases states of starvation and anti-intoxications exist, the removal of which is of equal importance to that of spirits. The study of the diet brings out many unsuspected causes, which require removal and treatment before a cure can be effected.

NOTES ON
PRACTICAL SANITARY SCIENCE.

By WILLIAM H. MAXWELL.

Assistant Engineer and Surveyor, Leyton Urban District Council, Author of "Drainage Work and Sanitary Fittings," "Ventilation Heating, and Lighting," &c., Certificates of the Association of Municipal and County Engineers, and Sanitary Institute.

No. 56.—REFUSE DESTRUCTORS.

(*Continued from page* 334.)

The "Bennett-Phythian" Destructor.

The "*Bennett Phythian*" constant high-temperature destructor is an apparatus which has very recently made its appearance, and a furnace of this type has been erected by the Farnworth Urban District Council. The special features of the furnace will be apparent from an inspection of Figs. 24, 25, and from the following description:—When at work the fires are burning upon the grate in two of the cells, the other being empty. The central cell obtains a maximum heat, and when it requires re-charging the grate is moved to bring that part which was in the central cell into the empty side cell, and that which was in the outer cell into the centre, and thus, without cooling the central cell or furnace, a fresh charge is brought into it which had been gradually increasing in heat. The grate that has been moved into the empty cell is then clinkered and re-charged, and the blast turned on to it, when it gradually increases in temperature, the products of combustion from it passing over the hotter fire in the centre, until that in its turn requires re-charging; and thus the side cells are alternately re-charged and the grate moved to carry the charge into the central cell. The grate on which the refuse is placed may be moved by the rack-and-pinion arrangement illustrated, but an electric motor may be utilised for this purpose.

Some of the points claimed for it are:—

(1) That it is capable of destroying 24 tons of house refuse in twenty-four hours, and at the same time of raising steam for electric light or other purposes.

(2) That all gases pass over the central cell, where constant temperature is maintained at 2000 deg. Fah.

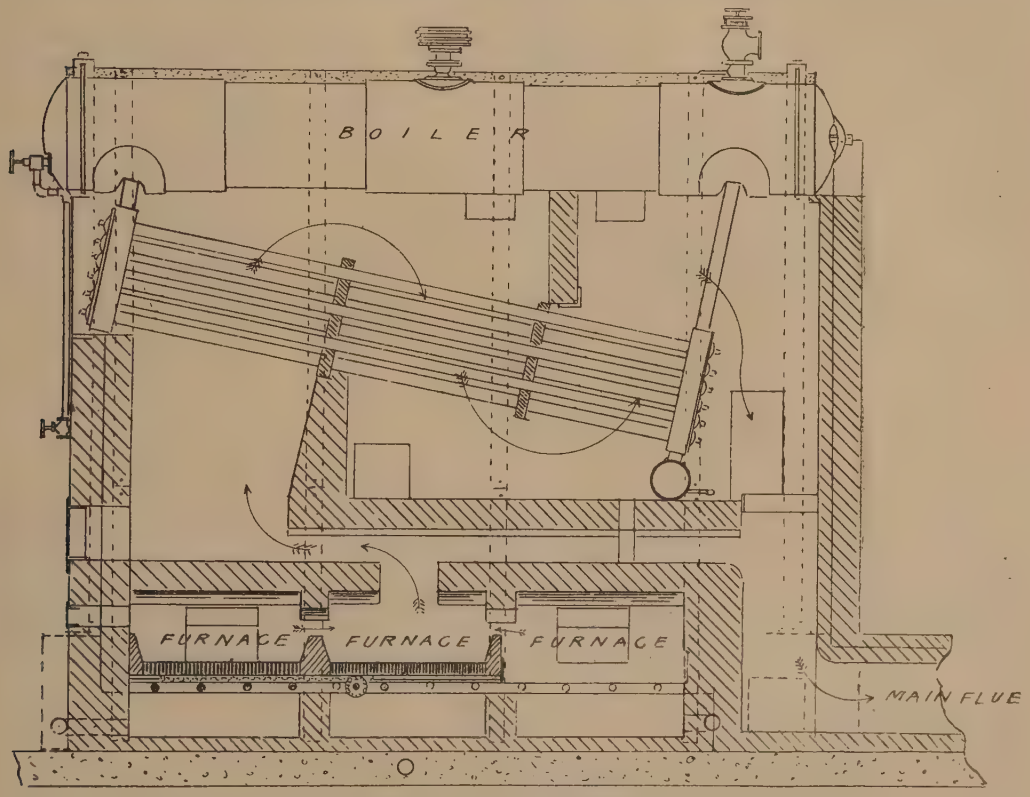


Fig. 24.—Section of the "Bennett Phythian" Destructor.

(3) No elevated roadway is required, and the charging and clinkering are done on the ground level.

The Willoughby Patent Refuse Destructor.

The Willoughby refuse destructor, as now in use at Lewisham, is the most recent type of furnace that has been adopted, and, as will be seen from the accompanying illustrations (Figs. 26 and 27) possesses several entirely new features. It consists mainly of a furnace and a revolving cell.

The *furnace* is placed at one end and fed, not with town's refuse, but with gas coke, coal, or breeze, assisted with a draught forced by Meldrum blowers, so as to give a fire of high temperature.

The products of this furnace escape into a revolving cell.

This *revolving cell* consists of a long tube of iron or steel plate, lined throughout with fire-brick, and fixed at a small angle from the horizontal. The first portion of this cell or tube (Fig. 26) has a diameter of about 8ft., and the lower portion one of about 5ft. Each section is about 23ft. in length. In the inside are projecting fire-brick ledges arranged so as to give a series of longitudinal ribs which serve to catch and carry up the contents of the tube, and drop the same time after time as it passes along the length of the cell.

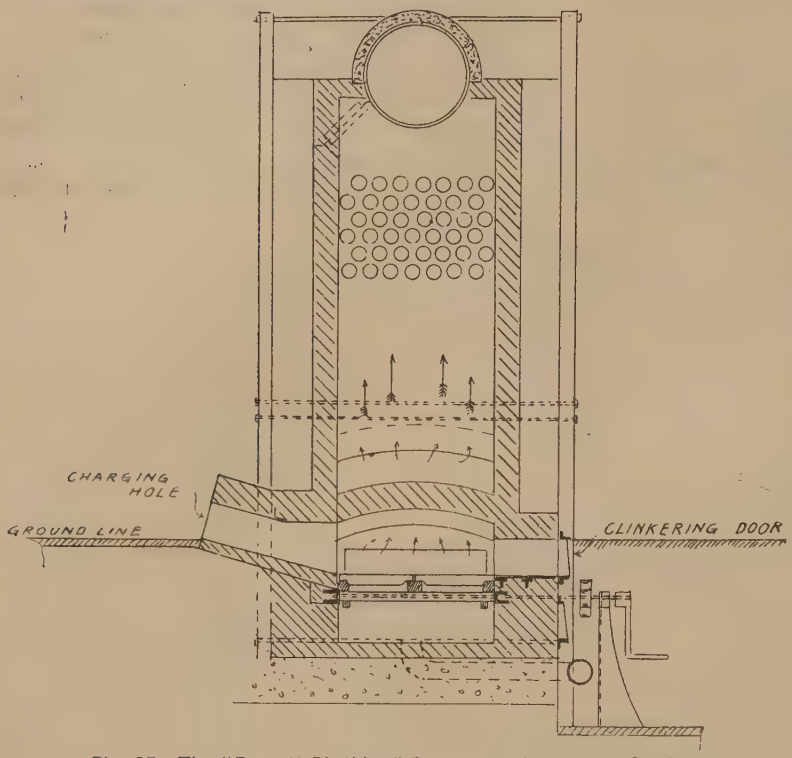


Fig. 25.—The "Bennett Phythian" Destructor: Transverse Section.

The tube is carried within a series of stout rings which run on bearing rollers. One ring is geared o an engine, which gives the rotary motion to the cell and actuates the residue elevator, the feed ram, and the ash screen, &c. The cell revolves slowly, and the speed is regulated according to the nature and condition of the refuse to be destroyed. Sight doors are provided through which the interior of the cell is fully visible.

The refuse is brought, as usual, up an inclined roadway, and delivered on to a tipping platform near the feeding hopper, which is placed over the coke furnace. A large slowly-reciprocating ram enters the base of the hopper and pushes the refuse along a short tube, which terminates at the upper end of the revolving cell. The lower end of the cell opens into a charpit, which serves as a receptacle for the unburnt residue from the cell. Beyond this pit is a multitubular steam boiler and secondary furnace — for use only when the destructor is idle—and flues leading to the chimney.

When the destructor is first put into action, the furnace at the front end is lighted, and a few hours are required to get the cell and walls of the chamber to a glowing heat. Then the ram is started, and about six times per minute a small portion of refuse is passed into the hot cell. Falling as this does immediately in front of the furnace on the red-hot walls of the cell, all light burnable stuff is immediately consumed, and no screens are necessary to keep paper from getting out of the chimney top as in some destructors. The fumes or gases arising from the burning of semi-putrescent matter which constitutes a considerable part of a town's refuse, become thoroughly burnt, having to pass along the whole length of the glowing walls of the revolving cell before finding their way into the flue. No two lots of refuse delivered by the ram fall upon the same spot of the cell at one time, and therefore no heaping up and stewing of green refuse is likely to take place. By the revolving action of the cell,

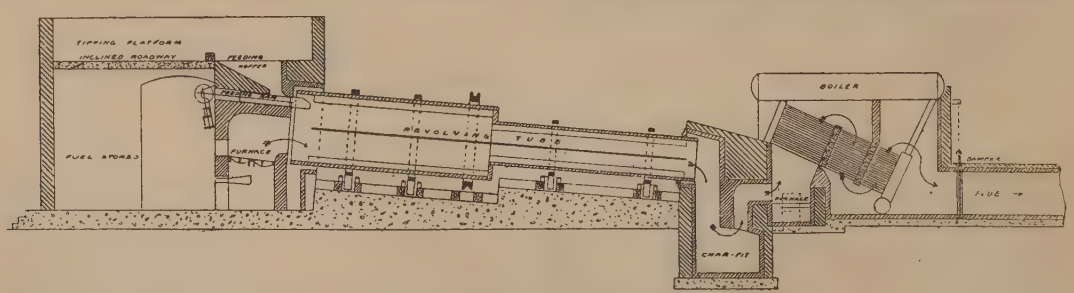


Fig. 26. Section of the Willoughby Patent Refuse Destructor.

and its inclination towards the charpit, the refuse is gradually carried away from the front until what is left unconsumed is delivered into this chamber.

This unburnt residue consists of chards, tins, glass, and cinders, but *no clinkers*. The longer the refuse takes in passing through the cell the less cinders are delivered. These at Lewisham find a ready sale, and the only residue for which there is no market consists of tins, glass, chards, and similar unburnable material. The whole of the residue is delivered in a state of bright incandescence, and is entirely free from any organic matter.

As the residue escapes it is quenched with water, and passed up an elevator to a graduated revolving

The new destructor is also claimed to give the best results in raising steam for electric lighting or other purposes.

In a report of Messrs. Alabaster, Gatehouse, and Co., upon this destructor as now in use in the yard of the Lewisham Board of Works, Molesworth-street, Lewisham, S.E., it is stated that at the time of their visit the whole of the interior of the revolving cell was found to be in a bright-red condition, and full of refuse and flame. Being about 36ft. in length, the progress of the refuse is of considerable duration; and with such a temperature (at least 2000 deg. Fah.) it is impossible for any gases given off by putrescent matter to escape unburned and unpurified.

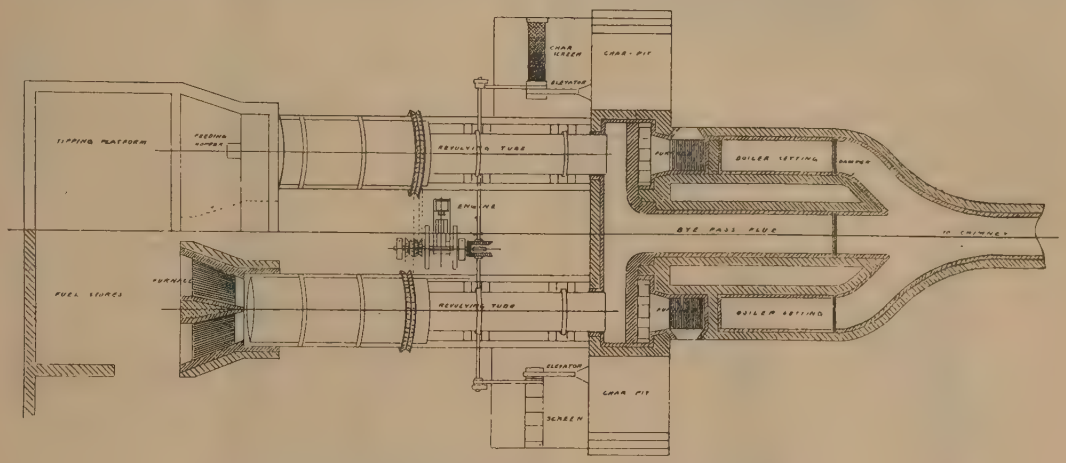


Fig. 27.—Plan of the Willoughby Patent Refuse Destructor.

inclined wire screen, which sorts to size and rejects the tins, sheet iron, &c.; the sand is separated out for the use of builders and others, and the breeze or cinders for fuel.

In the long flue leading to the chimney shaft is a water screen about 4ft. from back to front. This screen separates out the dust from the flue gases, and discharges it with the water into a pit, from which the dust is removed as required.

There is *no clinker* to deal with from the refuse passed through the Willoughby destructor, and at Lewisham, where the first installation of this furnace and plant has been laid down, the only portion of the unburnt refuse which has to be carted away is the chard, &c., amounting to about 4½ per cent. of the refuse treated.

Four men with one such cell as shown in Fig. 26 would, it is estimated from the Lewisham experience, pass through four tons of refuse per hour. One man attends to the ram feeder, one to the coke fire and the engine, and two on the unburnt residue. The wages for four men for this work would, of course, vary with the locality; but, taking a rate of pay of 6d. per hour, the *cost of labour per ton* of refuse passed through the destructor is put down at 8d., and the *cost of fuel* being about 3d. per ton, the refuse, it is claimed, is thus burned, and the residue[138] disposed of at a total cost not exceeding 1s. per ton.

[138] The residue or clinker at some destructor works is a source of profit. At Leyton this is sold by contract at the rates of—clinker, 6d. per load; fine ash, 1s. 4d. per load; the contractor undertaking all cartage and labour of removal.

Mr. H. Graham Harris, C.E., the Engineer appointed by the Board of Works for the Lewisham District, to examine as to the efficiency of the destructor, reported in November, 1897, that the conditions of the agreement of the manufacturers with the Lewisham Authorities as regards the consumption of the furnace and the absence of nuisance had been satisfied. The words of the agreement on this point were as follows:—(*a*) "That the destructor will cremate from 40 to 50 tons of house refuse per day of 24 hours, and that the formation of clinker from house refuse is impracticable excepting as to residue." (*b*) "That the destructor will destroy all noxious and poisonous gases and smells arising from this refuse while cremating."

Professor Dewar caused a good deal of amusement at the Royal Institution on Friday night by producing a milk can, which he had filled with liquid air, and pouring the fluid out, just as one would the more familiar substance, milk. A few years ago, he said, liquid air could only be obtained by the pint, now a gallon of it could be produced with the greatest ease, owing to the improvements in the apparatus for its manufacture. Professor Dewar remarked that many industrial and commercial uses for liquid air had been found, and as its production was cheapened further applications would be sought for.

THE SANITATION OF DOMESTIC BUILDINGS.

By Frank Latham, C.E., M. San. Inst., &c., Assistant Surveyor, Borough of Margate.

CHAPTER VI.

Section 2.

FLUSHING APPARATUS.

Having selected a good and reliable closet, its satisfactory working depends on the efficiency of the flushing apparatus provided. The use of unsuitable flushing apparatus is neither sanitary nor, in the long run, economical, most of the old flushing appliances being great water users with comparatively small results, whereas the flushing could be better done with less trouble and unnecessary waste of water by the use of more perfect systems.

There are numerous descriptions of good flushing apparatus for closets, but before considering these it is necessary to give examples of unsanitary methods in order to guard against them. In most instances where the supply is intermittent, houses

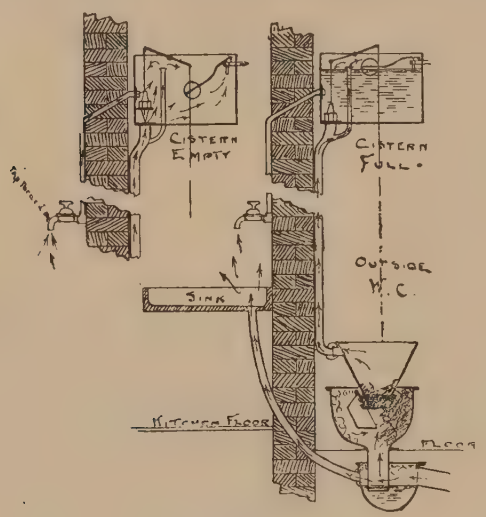


Fig. 69.

are provided with cisterns for storing the water for domestic and other purposes, and sometimes the closets are flushed direct from these cisterns, the result being that the supply may be contaminated with the impure air from the closets through the flush pipe or other intercommunication. Figures 69 and 70 illustrate some defects reproduced from the author's note-book. It is a matter of grave importance that no such direct connection should be allowed, although, without doubt, the number of houses in which such a dangerous defect exists would upon examination be found rather a large one.

Frequently the only flush to a water-closet is by turning on a tap on the water service (Fig. 71). This not only gives an insufficient flush, but is a great water waster, and a very dangerous contrivance for contaminating the water in the pipe or main, especially when the supply is intermittent, or at times when the mains are emptied by accident or otherwise, foul air, and possibly other matters, being sucked into the distribution system. No closet should be flushed off any arrangement in direct connection with the water supply of the house, but be provided with either proper flushing valves or separate flushing cisterns. Flushing valves are now nearly obsolete, and their working not always sanitary, their main faults being that in cases where the flush pipe is on the water service, should the pipes become empty by the water in the main being turned off for repairs, or through

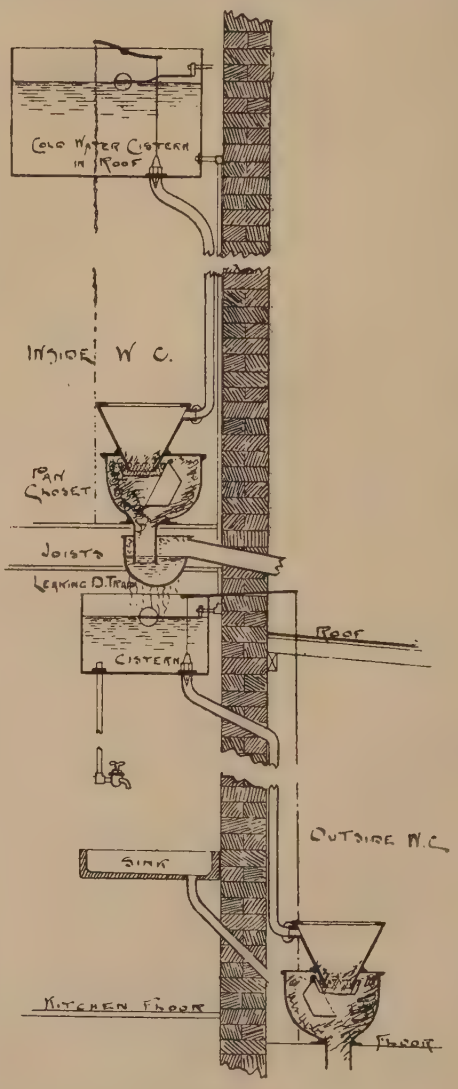


Fig. 70.

the supply being inconstant, the same disadvantages attach to them as to the turn-down tap.

Closets should be provided with syphon flushing cisterns, such as Jennings' (Fig. 72) or Jones and Brice's (Fig. 73), one for each closet, and fixed on the wall 5ft. or 6ft. above the floor on brackets. These cisterns should then be supplied with water by a separate service, either from the main or storage system (Fig. 74). This cistern is connected with the closet by a lead flushing pipe, which

should be carried direct from the cistern to the closet basin, and firmly jointed at each end in the best and strongest manner. It ought not to be less than 1½in. in internal diameter, and that size maintained from the outlet of the cistern to the flushing rim. By using this sized pipe it will be found that the large and quick flush thus provided will more effectively cleanse the basin and drains than a smaller and slower one would.

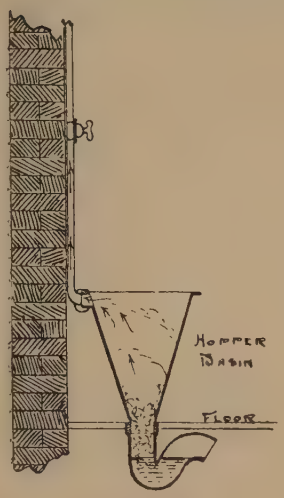


Fig. 71.

Syphon cisterns should not hold less than a two-gallon flush, to be discharged immediately on the handle being pulled, the whole being syphoned out in three seconds. A two-gallon flush is sufficient to cleanse most good closets and drains, where the soil pipe is 3½in. in diameter and the drain 4in. with good fall, but in cases where the drains are 6in. or more it is advantageous to use a three-gallon

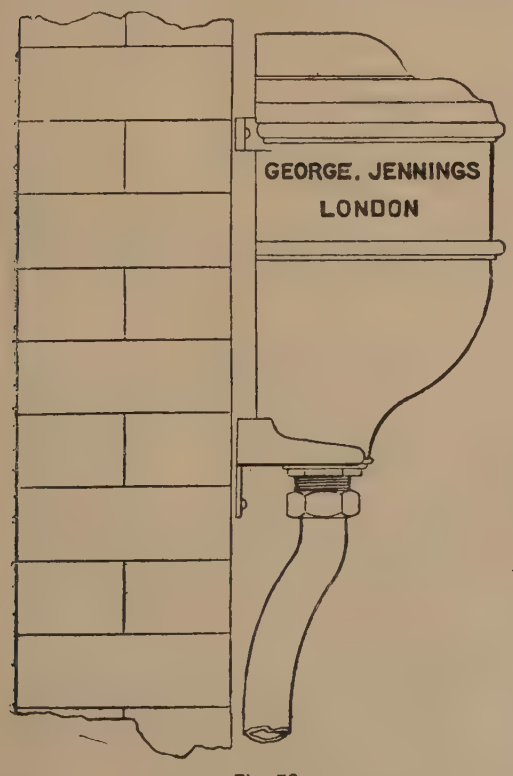


Fig. 72.

flush, *i.e.*, if the water company will allow it. This again shows that now-a-days, when the economical use of water is an important matter, the advantage should be taken of using 4in. drains for ordinary sized houses, as requiring a less amount of water for effective flushing than larger sizes.

Automatic flushing tanks and cisterns, although not so much required in the majority of house

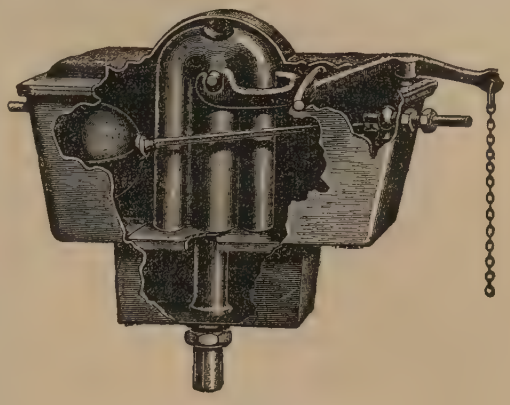


Fig. 73.

drains, are invaluable when fixed at the head of lengths of drains, especially in cases where only a small fall can be obtained. These tanks are generally constructed on the syphon principle with

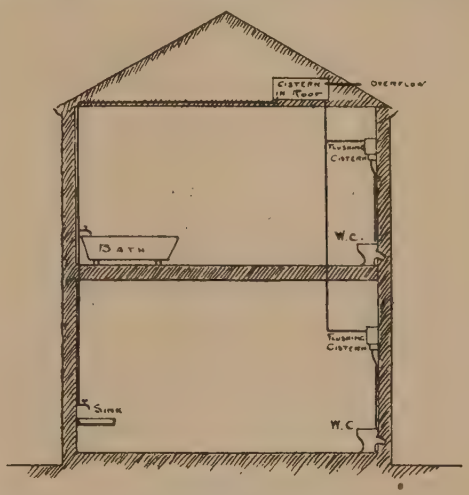


Fig. 74.

delivery of large bore so as to allow of their contents being emptied at once into the drain. They can either be supplied with water from the main or with waste water from baths, lavatories,

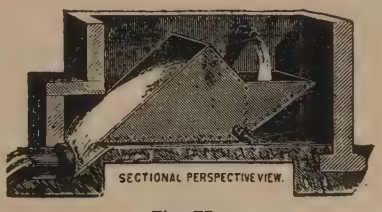


Fig. 75.

sinks, and rain-water pipes, &c., which otherwise would generally dribble down the drain with little cleansing power. They can be obtained to hold from a small to a large amount, the general size

being about eighty gallons. The tip-over contrivance is also a good form of flush. That manufactured by Messrs. Braby and Co. (Fig. 75) has a tipper made in two compartments, so that when the principal or large one is discharging it is replaced by the smaller, which upon being filled outweighs the larger vessel and tips back again, into position. The apparatus is enclosed in a brick chamber and made to discharge into the drain, being fed by the waste water which is conveyed to it by a pipe, and tippers can be obtained to discharge any amount up to two hundred gallons of water at a time.

Trough closets and urinals should always be fitted with automatic flushing cisterns of a capacity suited to the number of stalls and length of the trough. The discharge can be regulated according to the requirements of the apparatus.

EPIDEMIOLOGICAL SOCIETY.

AT a meeting of the above Society, held on March 18th, Professor J. Lane Notter, M.D., President, in the chair, Dr. D. S. Davies read a paper on "Milk-borne Enteric Fever in Clifton," in which he considered the distribution, incidence of attack, and character of illness. The facts of the outbreak already reported in the *British Medical Journal* of December 4th, 1897, page 1669, were shortly as follows:—A brook polluted with sewage passed through a farm K, where the unboiled water of a well sunk close by the stream was used for washing the cans. Milk from this farm was supplied to 57 houses, in 41 of which 101 cases of enteric fever appeared, and 20 other houses in which 33 cases occurred were found to have obtained the same milk from the dairy. A second supply from L, originally pure, but mixed before entering the city with some from K, was distributed to 39 houses, of which 15 were attacked, the cases numbering 37. A third supply, also pure, was distributed on three distinct walks, in two of which no cases occurred; the third remained free until on one occasion, in consequence of the reassembling of the schools causing a sudden increase in the demand, the carrier, meeting the man in charge of one of K's walks, took a quantity of milk from him. Of the 16 houses at which he subsequently called 8 were attacked, and 22 cases occurred; the only case in the twelve houses visited before their paths crossed was that of a servant, who, living close to K's shop, had drunk milk from that supply. Thus 94 per cent. of all the cases in Clifton were clearly traced to the milk from a single farm. The mean death-rate from enteric fever has ever since 1878, when an outbreak was caused by an infected milk supply from Westbury, been only 8·5, as against 19·8 in the 33 great towns; and the cases up to September, 1897, several of which were introduced from elsewhere, had never exceeded 4 in a month. But about the end of September Dr. Davies was informed of an outbreak of "influenza" in certain "houses" connected with Clifton College. Since the inmates of these associated in school with those of the other houses which escaped, he doubted the correctness of the diagnosis, and obtained samples of the blood of the patients for Widal's test, and by October 24th he and Dr. Klein had obtained positive evidence in 38 out of 41 cases, one of the three doubtful cases being verified *post mortem* by the presence of the bacilli in the spleen. The next day, instead of having recourse to the tedious procedure under Section 4 of the Public Health (Amendment) Act, which would have involved the loss of nearly a month, he induced the Sanitary Authority to buy up the whole of the milk from the farm in question for four weeks, meanwhile taking steps to prevent the recurrence of the pollution. The paper was illustrated by several tables, embodying facts not previously published. Thus, on the regular walks, 58 were attacked with 186 cases, and 27 houses with 44 cases obtained milk from two shops supplied with the same milk. Besides these 13 houses with 14 cases obtained theirs from shops not proved to have received milk from infectious sources—that is, 230 of the 244 cases were known to have drunk milk from the one farm, and of the remaining 14, three had very probably done so, three were customers of a shop close to that supplied from the farm, while one, a medical student, and three nurses, may have been infected by neglect of precautions in their contact with the patients. Of the eight college houses, however, five using this milk were attacked, and three with pure supplies were not.

The males of all ages were 80, and the females 164; of the former 65, and of the latter 75 were under 20 years of age; the males between 30 and 35 were 9; the females 63, the excess being mostly domestic servants. Of these, of all ages, 3 were males and 62 females, with 2 and 12 deaths respectively. Of boys at school there were 58 cases with one death, and of girls 52 with four. Four schoolmasters and four mistresses were attacked, one of each dying, while the one medical student and one of the three nurses attacked died. Some of the numbers were too small for safe conclusions, but the low mortality among the cases under 20 years, 6·4, and the heavy rate of 21 per cent. at higher ages, was very striking; indeed, the deaths among the 66 between 15 and 20 were only 6·0 per cent., and those among the 29 between 20 and 25 years were 31 per cent.

The results of 192 cases in which he used Widal's test were positive in 138, all but two of which were clinically confirmed, 14 were doubtful, but in 6 there was clinical evidence of enteric fever, and of the 39 that did not react on the first trial, four, two of which gave positive indications on a repetition of the test, subsequently developed enteric symptoms, but in 35 the negative results of the test were confirmed by the course of the case. He was therefore decidedly of opinion the Widal's procedure afforded valuable assistance in the early stages of the disease, before its true nature could be determined on clinical evidence alone.

Dr. WASHBOURN looked on Widal's test as a valuable aid rather than as an absolute indication, though the alleged reaction in scarlatina was easily distinguished; the scarlatinform rash observed in some cases was frequent in all febrile states. He doubted if enteric fever was ever notified much before the third week from infection.

Drs. CHILDS, BULSTRODE, and SWEETING asked whether there were premonitory and collateral diarrhœa, or secondary cases of typhoid, and criticised Dr. Davies' estimated incubation periods,

and statistical conclusions from too scanty materials.

The PRESIDENT had known enteric fever break out among troops three weeks after their arrival in isolated, even uninhabited regions in South Africa and Afghanistan. The report of the chemical and microscopic examination of the water shown by Dr. Davies was the work of a mere chemist, and useless for practical purposes. There was no doubt as to the connection of the fever with the milk supply; the question was how the milk became infected, and such inquiries should be entrusted to the Medical Officer of Health himself, not to the analyst. Widal's test could be overrated; indeed, he preferred Ehrlich's test of the urine.

Dr. DAVIES replying, stated that a bacteriological examination of the water of the farm was made by Professor McFadyen, but not until October 26th, when large numbers of B. coli were found. There were some secondary cases besides the student and three nurses, one of whom could not have drunk any of the infected milk. The autumnal wave of diarrhœa was below the average, showing that epidemic did not develope from small beginnings, but, like all outbreaks caused by infected milk supplies, it was sudden and simultaneous.

Annotations from Annual Reports.

Proximity of Trees to Dwelling-houses.—The proximity of trees and shrubs to dwelling-houses is not generally considered in the light of a health problem, but the fact that it is to be so considered is raised by Dr. Owen Coleman, Medical Officer of Health, Surbiton, in his Annual Report for 1897. Surbiton, it may be mentioned, is a popular London suburb, where trees and shrubs form a considerable item, both in the front and rear of the dwelling-house. According to Dr. Coleman, "it is not the trees in the roads, whether they are big or little, nor the large forest trees that still fortunately exist in some numbers scattered about the district, that affect the public health, but the perfect jungle that so many householders encourage in their front and back gardens, and seem to love to cultivate, that are so prejudicial. They darken the lower rooms of the houses, keep the ground damp and sour, and obstruct the proper access of fresh and wholesome air to the lower parts of the houses. During the night, when the warm self-contained air naturally rises, and to some extent passes out of the upper part of the house, its place is supplied by air coming in at the basement or ground floor; and if this has to be filtered through bushes and undergrowth mixed with the exhalations from damp soil charged with decaying organic matter, it is small wonder that some households find themselves specially liable to sore throats or indifferent health. These not infrequently are never advised as to the possible cause, but incontinently refer it to the neighbourhood as a whole, and either go on suffering or pack up and leave the place. The big trees (due regard of course being had to their soundness) have an important part in keeping up the salubrity and equable climate that is peculiar to that part of the Thames Valley. They serve as wind screens, and act the same part as a breakwater does in subduing the violence of the waves. Remove them to any large extent, and undoubtedly, as a consequence of becoming more wind swept, the temperature will be sensibly lower in winter, and the character of the whole of the district altered. This is a well-known fact, and de-foresting on a large acale has been found to alter the climate of considerable tracts of country very much for the worse; and what is true on a large scale may justly be anticipated to be equally so on a small."

MR. GLADSTONE'S ALLEGED INDIFFERENCE TO SANITARY LEGISLATION.

AN old medical friend of Mr. Gladstone and who had been somewhat of a sanitarian all his life, is wont to complain that he has never been able to enlist the attention of that mind of large and multitudinous interests in questions of sanitary reform—questions of infinitely greater importance to Englishmen than the troubles of Bulgaria and Armenia. This venerable physician has come to the conclusion that sanitation lacks in those "showy" qualities that lead public men to become the champions of subjects that excite the *vox populi*. The best way to get politicians to consider the public health is to educate people up to that point where the latter will begin to insist upon having that theme put as "a plank in every platform." When votes are to be caught by pledges on behalf of sanitary reforms and administrations are turned out for not redeeming such pledges, then will the statesman arise to the needs of the commonwealth, and we will view the upbuilding of a national Department of the Public Health. It is not difficult to imagine how different might have been the position of public medicine before the world if Mr. Gladstone had, in the early part of his career and later, adopted sanitation as one of his war cries. It cannot be said that his attention was not properly called to the subject, for his lively foeman, Disraeli, in the seventies, threw down the challenge in a proposition that speedily sped around the English-speaking world, to the effect that "the first consideration of a minister should be the health of the people."

NEW BATHS AT NEWINGTON.—The public opening of new baths and wash-houses in Manor-place, Walworth-road, took place on Saturday, March 26th, in the presence of a large assemblage, which included Mr. Spokes, L.C.C., Mr. Parker, L.C.C., Mr. Gilbert, L.C.C., the Rev. J. W. Horsley, and numerous representatives of the Newington Vestry and other local bodies. The baths have been erected upon a site secured by the Newington Vestry in 1888, and occupy an area of 4242 square yards. The buildings, which have been erected from the design of Mr. E. B. I'Anson, include a laundry, two swimming baths for men, a swimming bath for women, and various private washing baths. The men's first-class bath has a water area of 120ft. by 40ft., and will hold 157,000 gallons of water. It is to be floored over in the winter, and will be used for public assemblies. The cost has been met by a loan of £41,000, repayable in fifty years.

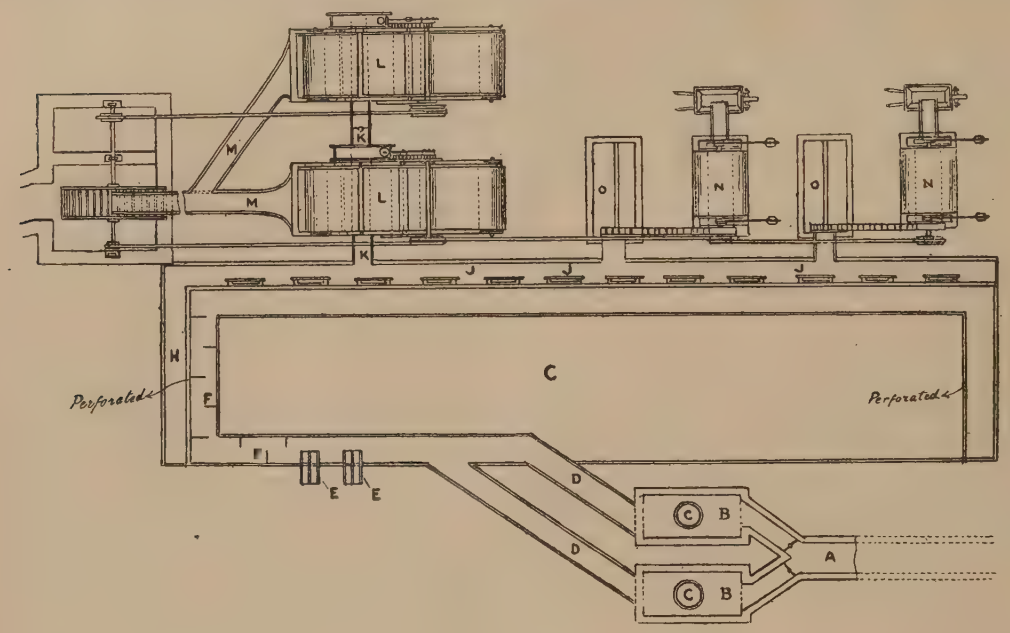
BIRSTALL SEWAGE DISPOSAL WORKS.

FOR the following particulars and accompanying plan of the Birstall sewage works we are indebted to Mr. William Birch, engineer, Lower Broughton, Manchester, the inventor of the system.

The population is about 7000. The district is a woollen manufacturing one, and has also a water-carried system. The sewage is of a very pollutable nature. The plant has been in operation for over three years, therefore the system has proved itself capable of executing its work, and has stood the test and experience which merits it as being a substantial and efficient one.

The flow of sewage is of a fluctuating character, as the district is very hilly, making it very difficult to manage under ordinary circumstances, but in this especial case no trouble is experienced. The sewage on admittance to the works passes by and dissolves a portion of the precipitant—blocks of alumino-ferric, which are placed in nearly perpendicular shoots, with one dipping into the sewage; by this simple arrangement the precipitant applied regulates itself.

After leaving the precipitant the sewage then enters one of the two silt traps (working alternately, to allow each of emptying when necessary), where all road grit and foreign matter is deposited, either by precipitation or screening. The sewage is led from these by a wooden trough in which are placed pieces of timber (bafflers) projecting out from the sides, against which dashes the sewage, breaking the solids up. By now flocculisation has taken place, and the sewage enters the whole width of the cast iron tank (the tank can be constructed of brick) and leaves at the opposite end, from the top, in a more clarified condition, and then passes on to the filter apparatus. During this process the precipitation of the greatest portion of the solids has taken place. The tank, which is continuous, never requires to be let off to extract the sludge, as the same is drawn off by means of ∧-shaped channels, over the whole area of the bottom, leading to valves at one end, or rather, the side of tank—these valves are so constructed that they will not crack during frosty weather. The sludge is directed on leaving the tank by a concrete channel to a sludge well, when it is then raised by a chain elevator to an automatic rotatory sludge press, where all superfluous water is forced out, and the sludge, about the consistency of mortar, is then delivered by a shoot into a receptacle ready for transporting to the land for manuring purposes.



A—Sewage Inlet.
B—Silt Traps.
C—Drain Wells (perforated).
D—Sewage Shoots.
E—Alumino-Ferric Boxes.
F—Bafflers.
G—Semi-ceptic Sludge Trap Settling Tanks (requires no emptying).
H—Overflow.
J—Sludge Outlet Valves.
K—Supernatant Water from Tank to Filtering Machines.
L—Filtering Machines.
M—Filtered Effluents.
N—Automatic Sludge Compressor.
O—Sludge Pits.

It will now be observed that the sewage has been freed of the greatest portion of the solids, which can be taken to the land in a portable condition. By precipitation the solids have been removed, but the clarified sewage yet remains in an unfit condition—it has not yet been sufficiently treated, and is not purified enough to enter any watercourse.

Up to this point it may be safely said that the sewage is the same in all systems of sewage treatment, and the methods by which it is arrived is more or less alike to all; the results obtained being practically the same with the exception of one or two, which claim to have no sludge to deposit, and which are of course being watched with great interest.

The tank for this plant measures 90ft. long, 17ft. 6in. wide, and 6ft. deep. This is an exceptionally small tank for the population; but, by active treatment, aided by the fact of having the same current of stream throughout the whole width over the full length of tank, produced by allowing the water to enter the full width of tank, and by being drawn off at the outlet for the full width, and also by having a slight fall at the inlet, checking the force and giving an almost imperceptible current at an early stage. As duplicate tanks are unnecessary, little space is occupied. There are two sludge-pressing machines, therefore it is no great item for the disposal of sludge.

The next and final treatment of the effluent is by artificial filtration unless afterwards filtered through land. The means of doing this are many, the chief amongst them being through sand, with also some purifying agent; this, like land, needs constant attention and periodical rest, or else it becomes "clogged" up and no longer fit for the work it has to perform. The filters used at these works are not of this description.

In order that a filter may do its work perfectly it must be kept constantly cleaned. As a sand filter cannot provide itself with any provisions for cleaning itself, and as it is not self-sustaining, it is at a great disadvantage compared to a filter whose medium is cloth—as cloth is self-sustaining, and provisions can be made wherewith it can be made to clean itself by motive power; also the impurities can be taken away as fast as they are arrested from the effluent by having the filtering medium (cloth) in constant motion.

The effluent is conveyed from the tank by a wooden trough on to the cloth, where all the remaining solids are arrested by straining action. The cloth, as it becomes loaded with impurities, is gradually working towards the cleansing apparatus, where all the solids are extracted—forced out, by means of an ingenious contrivance, where pressure is applied by springs to a roller moving and working intermittently round a drum over which the cloth travels, when it is subjected afterwards to a washing process. The water used is that of the filtrant water, thus, the filtering medium is kept constantly cleaned with motive power, instead of hand labour as in filter beds. The effluent on leaving the cloth passes over the surface of a series of wooden rollers—forming a bottom upon which the cloth travels—in a thin film, absorbing the oxygen of the atmosphere, hence the oxidisation and aëration of the effluent has taken place, which is the last and final stage for the purification of the sewage.

The waste water resulting from the washing process of the filter machines, of which there are two, and the superfluous water from the sludge presses is gravitated back to the tank for retreatment. The filter machines each occupy a space of 23ft. by 8ft., and the sludge presses each occupy 6 square feet. The motive power to drive the plant is derived from the filtrant water passing over a water-wheel, therefore the plant may be safely described as automatic. The works are situated within the heart of the district, bounded on two sides by the principal streets, and surrounded by houses—thus testifying to the efficiency of its operation.

Sanitary Inspectors' Associations.

LONDON.

THE ordinary monthly meeting of the members of the Sanitary Inspectors' Association was held on Saturday, at the Carpenters' Hall, London Wall, E.C. Mr. T. G. Dee, Westminster, the Chairman of the Council, presided, and there was a good attendance of members, including Messrs. C. W. Raymond, I. Young, H. Alexander, W. W. West, Potter, S. C. Legg, Barth, Pettit, Ashdown, Thomas, Chapman, Duck, Jordan, Bagshaw, &c., and Mr. E. Tidman, C.E., the Hon. Secretary. A number of new members having been elected and general business transacted,

The CHAIRMAN read a paper on "Sanitation in the Homes of the Working Classes," by Mr. T. J. Moss Flower, C.E., F.G.S., of the Western Branch, he being unavoidably absent. This was, he said, a subject more or less interesting to Sanitary Inspectors as well as to the public at large, particularly to those engaged in the application of the principle shadowed forth in the laws bearing upon sanitation in dwellings. The term "shadowed forth" was used advisedly, because in many instances, the intention of the legislators could not be successfully determined. The sanitary condition of the homes of the working classes was a matter receiving much attention in this country, and necessarily so, because it is a matter which greatly concerns the well-being of the nation, looked at from every point of view. Sanitary Inspectors were fully alive to the enormity of the degradation, misery, sickness, and death occasioned by the insanitary condition of working-class dwellings in this country—a country characterised as being "fair and beautiful," and "the home of the brave and free." The scope of the paper was to define some of the defects existing at the present time, to discuss a few of the causes, and to make some suggestions as to the possibilities of bringing about a better state of things. Who are the working classes? It was difficult, he thought, to define that class, since all persons whose existence depends upon their own efforts belonged to it, and it included not only the field labourer, the docker, and artisan, but also the merchant and the professional. But for the purposes of the paper the working classes might be regarded as those who gain their livelihood by manual labour, and whose income averages anything up to 32s. per week. The maximum rent they could pay was from 4s. to 6s. 6d. per week. Now, cottages they occupied in rural districts were generally more or less insanitary, being frequently thatched, without drainage or proper water supply. Large houses of the tenement type in towns were frequently found to be in a deplorable condition. Then there were the dirty little houses to be found off fine business thoroughfares—houses possessing two or three rooms, without a backlet or open space; houses built back to back, small houses in narrow streets; there were also the houses of the barrack or flat type, which, although a distinct improvement, were by no means ideal; yet they were the means to crowd upon a small area a large number of human beings. This was not necessary when so much land was available on the outskirts of the towns, provided cheap

and easy means of communication were granted. Overcrowding on small areas was to be attributed to the defects in the land laws, and until Parliament insisted upon the land bearing its proper share of taxation so long would they have to look upon this crowding. The building bye-laws in towns were not nearly severe enough in many respects, and in some cases they were practically a dead letter. This crowding upon area conduces to a low condition of life, a low standard of morality, and a high rate of mortality, helping to rob life of all its natural charm. Rents in the centre of large towns were so high that the working classes were driven to take what was on offer, with the inevitable results. For these people something would have to be done in the way of clearance of unhealthy areas and the erection of suitable dwellings. But the clearing of an insanitary area more often than not displaced more people than could be replaced. What then was to be done with those for whom no provision had been made? The only problem was to erect suitable dwellings on the outskirts of the towns and provide cheap travelling facilities. The insanitary evils most common in the homes of the working classes were overcrowding, defective roofs, gulleys and spouts, defective drains—coked, cracked, leaky, untrapped, unventilated, defective w.c.'s, unflushed, unventilated, in bad positions ; absence of ventilation, dirty walls, crumbling ceilings, absence of fireplaces, several thicknesses of dirty paper on the walls, want of lime washing, dampness from soft bricks and mortar, absence of damp course under walls and beneath lowest timber, site not covered with concrete, space not ventilated under floor, woodwork decaying from want of paint. All these evils were often aggravated by the site of the house being below flood level, or the house beiug built on hollows previously filled with house refuse. Overcrowding was one of the greatest difficulties of the Sanitary Inspector, for their poverty could not be removed. This evil existed not only in large towns but also in rural districts where there was absolutely no excuse for it. In watering places during the summer the homes of the working classes were frightfully overcrowded owing to visitors being lodged. The whole list was capped by the absence of legislation calculated to successfully deal with the proper housing of the working classes, by the Government and municipalities. A great deal of the responsibility rested with the Sanitary Authority, who gave to one Inspector work enough for half a dozen men ; not only so, but a large proportion of that one man's work was quite outside the duties of a Sanitary Inspector. The wealthy and the well-to-do could look after themselves, but the working classes who had an equal right to have their houses regularly inspected, were neglected. Further than this, the fact that the members of the local boards were too often interested in not having sanitary work properly carried out, had to be taken into account, and if a Sanitary Inspector was zealous he was liable to be turned out. The property owners were largely represented on the Local Authorities, and they could render an Inspector's life so unpleasant that he would prefer to resign at a great sacrifice, rather than remain and be afraid to do his duty properly. Parliament was to blame for this, and therefore the Association asked for a secure tenure of office for Sanitary Inspectors, who would use the power given to them only for the good of the many in a just and fair spirit. But it was not to be thought either that the working classes were not themselves in some instances to blame for the insanitary condition of their homes. In such cases the evils were difficult to deal with, but improvement in this respect was to be expected in the future from a course of hygiene being made a part of every school curriculum. Landlords often would do nothing for their tenants, and while houses were in agents' hands or changing owners it was most difficult to get nuisances due to structural defects abated. An amendment of the law in this respect was urgently needed, fines for non-observance of the law increased with power to the magistrates to send offenders to prison. Magistrates, too, were often unable to look at sanitary requirements with a broad mind, and dealt leniently with property owners. It was the duty of the Sanitary Inspector in carrying out his noble work to see that those who could not well help themselves should receive his willing and ready assistance. Those who preached the gospel of health should live the gospel of health, and should be placed in such a position that they can conscientiously and fearlessly do their duty to all men without fear of tyranny or the loss of the means of existence. The nation which did not pay proper attention to the improvement of the sanitary condition under which the working classes live, must eventually make way for other nations that do, and while this country was by no means in the rear in this important national work, there was much which still required to be done.

Mr. W. W. WEST (Walthamstow) moved a hearty vote of thanks to Mr. Moss Flower for his paper, and this was seconded by Mr. DUCK (Plumstead).

Messrs. ALEXANDER, YOUNG, THOMAS, CHAPMAN, and the CHAIRMAN took part in the discussion which followed, and the vote of thanks was heartily accorded.

The members' private conference was then held, and the proceedings ended with the usual compliment to the Chairman.

WHAT CITY MEN BREATHE.—Some interesting statistics relating to the presence of dust and bacteria in London air have been reproduced in the first number of the "Transactions" of the British Institute of Preventive Medicine. From experiments made, it appears that in a suburb the dust particles numbered 20,000 per cubic centimetre in the open air, and 44,000 in a quiet room ; in the City, on the other hand, the totals per cubic centimetre were 500,000 when taken from a roof, 300,000 in a yard, and about 400,000 in a room. In the City the dust contamination was proved to be 900 per cent. greater than in the suburbs, which fact is in accord with the general experience that fogs are both more dense and more frequent over the centre than in the outskirts of the City. Although dust is the great carrier of micro-organisms, the proportion of the one to the other was found to be not higher than one organism to 38,000,000 particles. Calculating 100 organisms per cubic metre, a man in the course of his three score years and ten would inspire about 25,000,000 microbes, which is about the number contained in half-a-pint of milk.

Institute of Sanitary Engineers

THE SANITARY ADMINISTRATION OF BELFAST.

(*Continued from page* 343.)

It is quite clear that the poorer classes, whatever their employment, are more crowded together in their dwelling-houses and sleeping rooms, as well as in their work places, than others, and are therefore more exposed to the infection of this disease. From the same causes they are more likely to be debilitated by the want of good air, and therefore in a more favourable condition for yielding to infection. The circumstances of the case render it not so easy, however, to provide a remedy. Any we seek for must in part be found in improved action on the part of the Authorities, but in the main from improved intelligence on the part of those who suffer.

First of all, then, what regulations can be made which will protect the poor from this scourge? The regulation of work places must, after all, be partly conditioned by what will allow them to be carried on at a reasonable profit, otherwise the livelihood of the workers will cease. Short of this limit, however, ample provision for ventilation must always be insisted upon, and the use of warmed fresh air might be more often inculcated, if not compelled, than is the case. It is not the people who live in the open air, however much their exposure, who suffer from "colds," or who die of consumption. The butcher, the policeman, the bricklayer in his shirt sleeves upon the scaffold, are not consumptives. Neither is the sailor, who for days together has hardly a dry thread upon him; or yet the labourer in the fields—he may be bent double with rheumatism before he is sixty, but that is not consumption. It is the tailor in his warm and sheltered workroom, or the girl in the hot spinning mill or sewing-room, who wastes away with this disease.

But the chief remedy must come from the enlightenment of the people themselves. Every modern military bureau has now an intelligence department; such a department as, had England possessed one at the time of the Crimean War, would have informed the Generals that in the Crimea the winter usually set in early and was very severe, and that would have seen that the necessary precautions against this were taken in time. Why might not every Town Council—and County Council, indeed—also have an intelligence department, whose duty it should be to provide for the health education of the masses?

No doubt the enforcement of sanitary bye-laws is in itself a sort of education for the people, but it is slow and very imperfect in its operation. What is wanted is that every National School teacher should be acquainted with at least the elements of hygiene, and should be able to impart to their scholars simple lessons often repeated and enforced by example as well as precept, because, unfortunately, the great bulk of our elementary education seems to be so given that it remains something quite apart from and totally unconnected with the daily life of those taught. There is a very great mass of information upon sanitary matters, upon the laws of health in general, among the members of any Public Health Department, which should be freely placed at the service of the people. More especially might a series of simple health leaflets, couched in the plainest and most intelligible language, and printed in large type, be distributed broadcast amongst the working classes, and that not as a mere isolated effort only, but regularly and often repeated. Do we not all know as a fact, that, except perhaps in some moment of temporary panic at the outbreak of a great epidemic, not alone the poorer, but every class of the electors, care less than nothing for sanitary matters? The elections hinge upon a man's politics, upon his religion, upon any consideration rather than whether he is an intelligent sanitary reformer. No such qualification would weigh in favour of a man, however good and able, if he had not also the support of some powerful political organisation; if he possesses that, the want of the other qualification would matter but little to his chances of success. Several years ago a "Health Society" was started in Belfast under the most eminent, scientific and social patronage. It ran for about twelve months, and then suddenly ceased, certainly for anything but the alleged reason that it had accomplished its work. While in existence several health lectures were delivered under its auspices, among others, one by the Medical Officer of Health for the city. What I would contend for is that in every well-regulated community the Public Health Department should be a permanent health society, independent of fashionable caprice, and responsible to the whole constituency, but that will never be until municipal constituencies are lifted up out of the miserable slough of party politics.

There is a topic which has not yet been touched upon, but which to all child-lovers should be of surpassing interest. This is infant mortality. It is rather surprising that, considering the position of Belfast as a great manufacturing centre, it should come out under this head as creditably as it does. For the year 1896, the last to which I have access, the mortality per thousand births of children under one year old in Belfast was 147, for eight other large towns during the same period it was greater, viz., Dublin, Leeds, Liverpool, Manchester, Blackburn, Oldham, Birmingham, and Preston; Birmingham coming out worst with 197 per thousand. Yet Birmingham has always been taken as a model city in municipal affairs. The consideration of these figures leaves it rather difficult to decide exactly where the cause lies. The employment of women in Belfast in factories and work places of one sort and another is exceptionally large, and to the employment of mothers away from their homes infant mortality has generally been ascribed. Possibly an explanation may in the case of Belfast be found in the fact that there is here employment of many varied sorts, shipyards, and their concomitant works, as well as spinning, weaving, box-making, &c. &c., so that it may to a larger extent than in some other places have resulted, that while every other member, male and female, were employed the actual mothers could be left free to remain at home.

There can be no doubt, however, that in the case of infant mortality it is due to the ignorance or the indifference of the mothers themselves. The remedy must come from the improved mental and moral condition of these. But surely, if we

are to be governed at all, these matters must occupy the attention of our rulers. Papers like this deal not merely with the law and its administration as it *is*, but as it *ought to be*. The suggestions made may not always be feasible as the law now stands, but they are suggestions for a brighter future.

It was said to be the boast of a great Roman ruler, that he "found Rome of brick and left it of marble." Referring to this, a great English orator of the present century, speaking of the reform of the law, said, that he hoped that some English reformer might be able to boast, that he "found law dear, but left it cheap;" possibly rather a questionable boast, because law at its cheapest is apt to be found in the end an expensive privilege. But the boast will be without alloy if in some year—let us devoutly hope in the early future—some, or many, legislators may say that they found the health of the people bad, and the death-rate high, but that they left it low, and the health of the people good, and as a consequence thereof, the people happy, contented, and leading good and useful lives; the children happy and smiling, the youths full of exuberant life, those of middle age the masters of their work, and more than the rivals of foreign nations, and old age happy and contented, because healthy and without any but inevitable decay. To all these wishes let us devoutly say, Amen!

DISCUSSION.

Mr. WELLS proposed that a hearty vote of thanks be conveyed to Mr. Lockwood for his interesting paper. He had treated the subject in a very exhaustive way, and their thanks were due to him for the trouble he had taken in dealing with it. One thing he could hardly understand in the paper was why a large town like Belfast permitted large deposits of street refuse to be placed on sites near the town, which were ultimately intended to be built upon. He did not know what precautions were taken under the bye-laws of the city in regard to building on such sites, but it was a dangerous thing to build on a site 10ft. deep in house refuse.

The CHAIRMAN said he thought the paper said after seven years.

Mr. WELLS replied that that was not sufficient time to elapse before the land was built upon. He supposed the same bye-laws were in force in Belfast as in London. But even then he thought it rather a dangerous proceeding. He thought a dust destructor was a far better way of dealing with refuse.

Mr. DOVE seconded the vote of thanks, and said that Mr. Lockwood had taken very great trouble to bring the whole of the sanitary matters in Belfast before their notice. It appeared to him that not only did the Belfast Authorities allow the deposits of refuse to be placed on waste land, but that they were raising a bank on the side of the river, which, in his opinion, was far worse than placing the refuse upon waste land. Some years ago he knew a very large gravel pit. It was about 25ft. deep, and extended over two acres of land. It was a portion of a brickfield. It became a common shoot, was ultimately filled up, and had now for years been built upon. He happened to know some people who resided in those houses. Some of his friends went there when the houses were just finished and others at a later period, but from the first to the last there was always a complaint about dampness. Of course cracks were numerous, and he believed the whole portion of the brickfield had a bad reputation for sore throats.

Mr. RAYNER, referring to the question of notification of diseases, said that he had noticed the poorer classes generally had a dread of hospitals, and would not go to them when there was a case of infectious disease in the house. They always tried to keep the infectious person at home, and by that means many other persons in the neighbourhood had the disease communicated to them. He noticed in Sutton there had been one or two such cases, and the Sanitary Inspector had had to deal with them rather strictly. He thought the poorer classes required to be educated on the matter. When they educated them in sanitary laws they would see the benefit to be derived from taking the patient direct to the hospital, and so be the means of stopping the spread of the disease.

The CHAIRMAN said that had time permitted he should have joined issue with Mr. Lockwood on his contention with regard to the conversion of cottage property to business premises. In the year-book of the Belfast Corporation he was very much struck in the progress that had been made there. He was in Belfast some fourteen or fifteen years ago and was very much impressed with the go-ahead way of the place, and the way in which the city was laid out as regarded open spaces. Belfast had only been incorporated since 1841, and at that time the population was 75,000. In 1891 it had risen to 255,000, in 1896 to 305,000, and they might safely put it now at 325,000. Apart from Johannesburg and Klondyke, he did not believe there was any town which had increased at the rate of Belfast. At the present time there were seventy-five sets of building plans presented per week to the Corporation, so that what with the progress being made on the old property before the foundation of the Corporation, he thought their sympathies might go out to those who administered the Health Acts and bye-laws under those Acts.

The vote of thanks was unanimously passed, and a similar compliment having been accorded the Chairman, the meeting dispersed.

The following gentlemen were elected as members by the Governing Body of the Institute of Sanitary Engineers at the meeting held on the 24th ult.:—

FELLOWS:—Aburrow, Charles, Assoc. M. Inst. C.E., Town Engineer, Johannesburg, South Africa; Adams, Stephen Isaac, Mem. San. Inst., Southend; Brook, James Riddell, Wimbledon; Hainsworth, Marshall, Mem. Assoc. Municipal and County Engineers, Teddington; Harlock, Harold, Assoc. M. Inst. C.E., Mem. Assoc. Municipal and County Engineers, Southend; Jones, Edwin John, Architect and Surveyor, Cardiff; Leed, James Constable, Cambridge; Matthews, James Newsome, A.M. Inst. C.E., Doncaster; Morris, Adam, Assoc. San. Inst., St. Boswells, N.B.; McLean, Hugh, Nottingham; Unwin, William Thomas, March; Stow, John Freebairn, Bridlington.

ASSOCIATES:—Bridge, Thomas Henry, West Bromwich; Chown, William Henry, Lympstone; Jaques, Henry Lea, Assoc. San. Inst., Moston, Manchester; Mansfield, William Joseph, Nottingham; Markham, William Ephraim, Assoc. San. Inst., London; Mankin, Hender Goman, R.P.C., London; Nicoll, Walter Ramsey, R.P.C., Sanitary Association of Scotland, Perth; Streather, Edward, Assoc. San. Inst., London; Sturch, Wilmer, London; Webb, George Stephen, Sutton.

General News.

HOME.

TWEEDMOUTH.—The boring for water is to be continued.

INGATESTONE.—The cost of the proposed water supply, exclusive of the land, is estimated at £750.

EASTBOURNE.—The plans for the proposed improvement of the Princess Alice Hospital have been approved by the Joint Committee.

MEDWAY.—Mr. G. E. Bond, architect, has estimated the cost for the new hospital at £4300. The plans have been submitted to the Guardians.

STRATTON.—The District Council has decided to proceed with the Wrasford Moor scheme of water supply for Stratton and Bude. The estimated cost is £9000.

WEST LANCASHIRE. — The Urban District Council has decided to advertise for tenders for the piping for the supply of water to Melling from the Kirkby and Knowsley pumping stations.

SOUTHWARK.—The Vestry has decided to apply to the London County Council for a loan of £3900 to defray the cost of the construction of underground conveniences in Old Kent-road and Borough-road.

WOOLWICH.—The Local Board has decided to make application to the Local Government Board to sanction a loan of £2500 for the purpose of erecting a new mortuary, post-mortem room, and shelter in Sun-street.

HEYSHAM.—At the annual parish meeting, reference was made to the arrangement with the Lancaster Corporation to supply Heysham with water, the cost of the scheme being estimated at between £3000 and £4000.

LANCASTER. — A conference of representatives of the Lancaster, Garstang, and Morecambe District Councils was held at Lancaster recently to discuss the proposal to erect small-pox and isolation hospitals for the combined districts.

ADERDEEN.—The Public Health Sub-Committee of Aberdeen district of the County Council has agreed to co-operate with the Town Conncil in the arrangements for the employment of Professor Hamilton as bacteriological examiner in cases of infectious diseases.

KEIGHLEY.—Owing to a fresh epidemic of diphtheria the Medical Officer has closed the infant and junior departments of the Holycroft Board School. Similar action was taken a few weeks ago with satisfactory results, but since the schools have been re-opened about a dozen more cases of the disease have been reported.

CHISWICK.—The annual report of Dr. Dodsworth, the Medical Officer of Health, has just been compiled for the District Council, and contains a mass of interesting statements and statistics, showing great improvement in the health of the parish. The vital statistics show a rise in the birth-rate, being about the average for the past ten years. The death-rate was one of the lowest on record, while the rate from zymotic disease was considerably less than that of the previous year. The year was, on the whole, a healthy one.

ROTHERHITHE.—Improvements are suggested for the swimming baths.

WROTHAM.—A Local Government Board inquiry has been held with reference to the provision of a water scheme for the district.

BURNLEY.—The Local Government Board has intimated to the District Council that under certain conditions it would be prepared to approve of the proposed scheme for providing a supply of water to Foulridge.

MIDDLESEX.—The Middlesex County Surveyor, Mr. F. H. Pownall, has resigned his post, and has been appointed consulting surveyor at a salary of £200 a year. The former office is now open, and the salary is to be £700 a year, rising to £850. There will be a deputy and two assistants at salaries of £250 a year, rising to £350.

DORSET.—With reference to the water supply of Maiden Newton, the Sanitary Committee recently reported that it was still in communication with the Governors of the Dorchester Grammar School as to the site of the reservoir. It had also received an offer from Lord Wynford of a site adjoining the previous site, and was considering which plan would be the more feasible.

ABERDEEN.—The report by Mr. Dyack, Burgh Surveyor, on the proposed public slaughter-house has been issued to the Committee in charge of the scheme. Mr. Dyack discusses the sites at Central Park, Hayton-road and Cattofield, and has also, at the Committee's request, prepared a modified plan of a building at Central Park. The estimates of proposals vary from £30,000 to £60,000.

NORTHAM.—The Urban District Water Bill, which has been read a second time, recently came before Mr. J. W. Lowther, chairman of Ways and Means. The object is to authorise the Urban District Council of Northam to construct waterworks for the supply of its district, the estimated cost of the undertaking being £27,000. The Bill, with amendments, was formally reported for third reading.

CHINLEY.—At a recent meeting of the ratepayers of Chinley, Bugsworth, and Browside, held to consider the proposed scheme of water supply for New Smithy and Chapel Milton, a small portion of the township, it was stated that the estimated cost of the scheme, as prepared by Messrs. Sterling and Swann, by direction of the Chapel-en-le-Frith Rural District Council, was £2500, exclusive of engineering and legal expenses. The proceedings terminated with a resolution requesting the District Council to convey the water all over Chinley and Bugsworth, in case the people have to pay.

DUNDEE. — In accordance with instructions given, Sir Thomas Thornton, Town Clerk, has prepared a report on the subject of the terms on which water is supplied by the Water Authorities of several towns in Scotland for sanitary and other purposes. The question was raised at the last meeting of the Town Council in connection with the supply of water to the harbour, and at the same time it was suggested that the Sanitary Department of Dundee was not paying its full share that the supply of water required. The report was submitted to a recent meeting of the Sanitary Committee of the Town Council, when it was agreed that the matter should be fully considered in detail.

BRADFORD-ON-AVON.—At the last District Council meeting it was decided to thoroughly overhaul the engine at the waterworks, and also to take up the remaining £2500 of the loan of £5000 for sewerage purposes.

ABROAD.

ROUMANIA.—At various dates between April 7th and May 11th, there will be adjudicated in this country tenders for the construction of barracks, slaughter-houses, &c., amounting to £120,000.

PERU.—The following Order has been issued by the Government of Peru:—"That a period of six months from January 15th be allowed steam vessels calling at ports in Peru to be fitted with disinfecting stoves. After the expiration of this time (say, 15th July, 1898) no steam vessel will be allowed to anchor in a port in Peru unless so fitted."

SYDNEY.—One of the most distant of the series of dams which are required to ensure for Sydney a constant supply of water had been washed away. The dam is that known as the Cataract dam, was about 500ft. across, rose to a height of 10ft. above the bed of the river, and was 14ft. wide at the base. The dam was constructed of concrete and masonry, and was generally regarded as a substantial work. It was stated that there was no occasion for any alarm being felt by the citizens of the metropolis or the residents of other places at present supplied with water from the Nepean scheme, because there is in the Prospect reservoir about 18 months' supply of water. The water is now running over the weir at Prospect, and the reservoir contains eleven thousand million gallons of water. The present rate of consumption for Sydney and suburbs is 20 million gallons per diem, and there being in the reservoir seven thousand million gallons of water which would be available for gravitation, it would take 350 days to consume this volume of water at the ordinary rate of consumption.

Personal.

MR. W. WYNNE has been appointed Medica Officer for number two district of Rye union.

MR. E. KENNINGTON has been appointed Medical Officer for number eight district of Basingstoke.

JOHN HENRY HOBLING, L.S.A. (Lond.), has been appointed Medical Officer for the Bideford rural district.

A. H. WHICHER, M.R.C.S., has been reappointed Medical Officer of Health for the Midsomer Norton urban District.

MR. C. R. SPENCER has been appointed Surveyor for the Belper urban district, at a salary of £150 per annum.

R. DAVEY BOASE, L.R.C.P., M.R.C.S., has been re-elected Medical Officer for the Penzance Port Sanitary Authority.

THE salary of Mr. T. Charles, Engineer and Surveyor for the urban district of Harrow, has been increased by £50 per annum.

MR. G. GREEN, late Assistant Surveyor to the Islington Vestry, has been appointed Surveyor to the St. Martin's-in-the-Fields Vestry.

THE Local Government Board has sanctioned the appointment of Dr. Pratt as Medical Officer for the urban district of Wiveliscombe.

MR. J. PAGET WADDINGTON, of Whitechapel, has been elected Surveyor for the Marylebone Vestry, in room of Mr. Tomkins, retired.

DR. CALEB J. POWELL has been appointed Medical Officer for the North Dublin union workhouse in room of Dr. Minehin, retired.

CHARLES J. MYERS, M.R.C.S., L.S.A., has been appointed Medical Officer of Health for the Louth rural district, vice R. Domenichetti, resigned.

ARTHUR D. FORBES, M.B. (Aberd.), has been appointed Medical Officer for the seventh sanitary district (Horsmonden) of the Tonbridge Union.

MR. E. W. CODE, of the Borough Surveyor's office, Tiverton, has been appointed District Engineer under the Ceylon Public Works Department.

J. MCKENNA, M.D., Ch.M. (Irel.), has been appointed a Public Vaccinator for Shepperton, Victoria, Australia, vice J. W. Harbison, resigned.

CHARLES W. VICKERS, M.R.C.S., L.R.C.P. (Edin.), L.S.A., D.P.H. (Lond.), has been reappointed Medical Officer of Health for Paignton, Devon.

W. KING BULLMORE, M.D., St. And., M.R.C.S, L.S.A., has been re-appointed Medical Officer of Health for the Falmouth and Truro Port Sanitary Authority.

J. W. COX, M.B., Ch.M. (Edin.), has been appointed a Government Medical Officer and Vaccinator for the district of Nymagee, New South Wales, vice H. R. H. Peare.

MR. F. A CLARKE, Plymouth, has been elected Engineer and Surveyor for the rural district of Plympton, at a salary of £150 per annum, and a commission of 2½ per cent. on all works executed.

MR. R. S. W. PERKINS, chief assistant to Mr. R. J. Thomas, County Surveyor of Buckinghamshire, has been selected by the Monmouthshire County Council for the appointment of District Main Road Surveyor under Mr. William Tanner, the County Surveyor.

Sewerage Schemes.

[TO MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

THE Urban District Council of Chesterton has borrowed £650 for sewerage works.

THE Local Government Board has sanctioned the borrowing of £300 for the Ormskirk end of Bickerstaff sewerage, West Lancashire.

THE Colwall Parochial Committee has resolved to accept Mr. Clarson's estimates of twelve guineas to make plans, sections, specifications, and estimates for the Wyche sewerage scheme.

THE Local Government Board has sanctioned the borrowing of £1000 for sewerage works at Bridlington.

A LOCAL inquiry has been held at Barnstaple with reference to the Town Council's application to borrow £3300 for sewerage and for a swing-bridge.

THE Chesterfield District Council has decided to call in Mr. Walker, of Nottingham, to prepare a sewage disposal scheme for the consideration of the Council.

AN arrangement between the Leatherhead and Ashtead Councils regarding the disposal of sewage as proposed by the Committee has been adopted by the latter Council.

THE Wellington Urban District Council has authorised the Drainage Committee to make further inquiry with a view to experimental works for the treatment of sewage.

A SPECIAL meeting of the Isle of Thanet Rural District Council was held recently in connection with the Minster drainage scheme. Mr. Bailey Denton was appointed engineer to the scheme.

THE Corporation of Wolverhampton has decided to abolish the catchpits on the old sewers, and to carry out other improvements at an estimated cost of £4560. The borough surveyor has also been instructed to make tests of various sewer flushing and ventilating apparatus.

ON Wednesday, the 30th ult., the Aberfeldy sewage purification works were formerly opened by Mr. Wm. Dunn, factor to the Marquis of Breadalbane. Mr. Copland, C.E., Glasgow, the engineer of the scheme, briefly described the works, and explained the system of purification.

A DEPUTATION, consisting of Mr. J. M'Hutcheon Dobbie, convener of the Lasswade District Committee of the County Council of Mid-Lothian; Mr. Charles Cowan, Valleyfield; Provost Liddell, Bailie Lucas, and Mr. Paul Goudie, Sanitary Inspector, Dalkeith, visited on Friday last the Glasgow Corporation sewage works, in view of the expected necessity for an extensive drainage scheme for the Esk Valley district.

THE Derbyshire County Council, which has long been threatening the Corporation of Derby with proceedings in respect of their pollution of the River Derwent, now signifies its intention of going into Court next May. The Corporation, while striving to remedy the nuisance, by the adoption of some effective scheme of sewage disposal, is anxious to avoid litigation, and at a private meeting it was decided to request the Mayor to wait upon Lord Waterpark (Chairman of the Public Health Committee of the County Council) with a view to securing an amicable arrangement.

A LOCAL inquiry is to be held at Newmarket into the Urban District Council's application for permission to borrow £45,000 for main drainage works.

A LOCAL Government Board inquiry has been held at Bexhill into the application of the District Council to borrow £4500 for the purpose of drainage at Little Common.

A LOCAL Government Board inquiry was held at Edmonton last week into the applications of the District Council for sanction to borrow several sums, including £4571 for works of sewerage.

THE Leyland Urban District Council has obtained the sanction of the Local Government Board to a loan of £5200 for the purpose of executing additional works of sewerage and sewage disposal, and their engineer, Mr. Wrennall, has been instructed to take the requisite steps for the execution thereof.

AT a meeting of the Rural District Council of Keighley, the question of Morton sewerage and sewage disposal was under discussion. It was suggested that the Council should apply for a loan of £4000. Neither of the Morton representatives would move to that effect. It was stated that the Council was under a binding contract to take the land. Finally it was decided to apply to the Public Loan Commissioners for £4000.

A LOCAL Government Board inquiry was held at York during last month in reference to the application of the City Council for sanction to the borrowing of £23,000 for sewerage purposes, as authorised by the Council. The application for power to borrow £2500 for the experimental septic tanks was opposed by Lord Wenlock and the fishery tenants below Naburn Locks. The Yorkshire Fishery Board and the West Riding of Yorkshire Rivers Board were also represented.

THE Public Works Committee of Balsall Heath Council reports that plans have been submitted for the laying out of the estates of Messrs. Smith-Ryland and J. R. Turner, lying between Balsall Heath-road and Edgbaston-road, and it is found that the sewers in the district are too shallow to effectually drain the area. It is also found that owing to the development of property in this part of Balsall Heath, the sewers which were constructed by the late Local Board are already overcharged, and that the sewers in Court-road and Clevedon-road are in an unsatisfactory condition. Under these circumstances it has been necessary to devise a scheme of main drainage for the low-lying portion of Balsall Heath, between Balsall Heath-road and Edgbaston-road. The City Surveyor has prepared a scheme by means of which the whole of this area can be effectually and satisfactorily drained, utilising the sewer in Alexandra-road, which is of adequate dimensions for the purpose.

THE Local Government Board has rejected the sewerage and sewage disposal scheme which was the subject of the recent inquiry at Warminster.

A SPECIAL meeting of the Monmouth Town Council was held recently, when the engineer, Mr. Lailey, was present by request, and was asked to explain how his original estimate for the drainage was several thousands of pounds below the actual cost. Mr. Lailey attributed some of the extras to the purchase of timber, cement, &c., the necessity for which was not discovered until after the excavations were commenced. Mr. Lailey submitted a new report on the drainage, which was complained of by the Council. It was eventually agreed to ask for powers to borrow £10,000 more to complete the work.

A MEETING of property owners and ratepayers, convened by a Committee appointed two years ago to watch the interests of the town in regard to the drainage area question, was held at Shifnal last week. Mr. J. R. Howard McLean presided, and said his views were in direct opposition to the formation of the proposed drainage area for Shifnal, or the formation of any area other than that including the whole parish. In the chairman's opinion, the water and drainage schemes for Shifnal could not be carried out for less than £9000. The number of the Committee was increased, their duty being to oppose the formation of the proposed area.

Lighting.

THE Enfield Gas Company's Bill has passed through Committee without opposition.

THE undertaking of the Kingston-upon-Hull Gas Company has been taken over by the Corporation, the price paid for it being £92,500.

THE York Corporation has come to an agreement with the local Gas Company, and as a result all opposition to the Parliamentary Bill promoted by the latter has been withdrawn.

A LOCAL Government Board inquiry has been held at Conway into an application of the Town Council to borrow £1500 for new municipal buildings, and £310 for gasworks purposes.

SWANSEA Corporation has under consideration a report by Mr. Manville on a scheme for electric lighting. The capital expenditure on this scheme Mr. Manville fixes, after adding 7½ per cent. for contingencies, engineering, &c., at £35,936. In his estimate of the revenue derivable he gives 15,700 8-candle power lamps for private lighting, which would, at 4½d. per unit, bring in £4444, whilst the public lighting would bring in £733, making a total of £5177. The cost of maintenance he averages at 3·05d. per unit, which gives a surplus of ·77d. per unit, or a total of £1052.

MR. PREECE is to be asked to enlarge the proposed boiler-house in connection with the electric lighting works at Wimbledon, so as to provide room for an additional boiler for a dust destructor, and to prepare plans and estimates for the latter.

A SPECIAL meeting of the Sheffield City Council is to be held on April 13th, for the purpose of approving of the applications to Parliament for a local and personal Act "to confirm an agreement for the purchase of the undertaking of the Sheffield Electric Light and Power Company (Limited) by the Corporation of Sheffield, and to confer borrowing powers and other powers on the said Corporation."

THE Electric Lighting Committee of the Edinburgh Town Council has resolved to recommend that the charges for energy from Whit-Sunday next should be 3½d. per unit with the ordinary discount, for each public lamp £14 per annum, and for motor power 1½d. per unit. The Committee has also agreed to recommend that the salary of the resident electrical engineer should be increased from £500 to £600 a year.

AT last Friday's meeting of the Oldbury District Council the Gas Committee reported having fully discussed the question of electric lighting, and the application to the Board of Trade for Provisional Orders both by the Council and the Midland Electric Corporation, and recommended that, subject to the approval of the Board of Trade, and providing satisfactory terms in all respects to the Council can be arranged, and the opposition by the Midland Corporation to the order of the Council be withdrawn. The Council discussed the matter in committee, but the idea is to keep control of the public lighting of the town, and to make arrangements for the Midland Corporation to supply the Council in bulk at a reduced rate, but to supply the manufacturers on their own account.

AT a meeting of the Gas and Electricity Supply Committee of the Bradford City Council last Friday the Mayor (Mr. T. Speight) presented an interesting report containing the result of the observations of a deputation which recently visited the Continent for the purpose of inquiring into the various systems of electric lighting and traction. The deputation visited Brussels, Hamburg, Berlin, Dresden, and Leipzic, the electric equipment of which towns was described at considerable length. It appeared that at Leipzic they inspected the works of Messrs. Körting and Mathieson, arc lamp makers, where special inquiries were made with a view to improving the public lighting arrangements of Frizinghall and Heaton by means of small arc lamps instead of incandescent lamps. The generating stations were very much larger and finer than anything to be seen in this country, and there could be no question but that, instead of making undue haste in the matter of electric traction for lighting, Bradford was in each of these instances considerably behind the development which had already taken place in each of the towns which were visited.

Law Cases.

NOVEL SANITARY PROSECUTION AT GOVAN.

A CHIMNEY sweeper named William Docherty was charged at Govan Police-court with having in his house permitted the body of his mother, who died of enteric fever, to be "waked" previous to burial. He pleaded not guilty.

From the evidence it seemed that the Sanitary Authorities had been notified of the woman's death, and in the course of the afternoon two assistants warned the accused that he would be prosecuted if he allowed a "wake" to be held, as it was illegal under the new Public Health Act. They again visited the house shortly before midnight, and found eight men, nine women, and two young children in the house, which was a single apartment. The body of deceased was lying in the centre of the room. When Lieutenant Sloan passed the window of the house about two hours later there was still a noise as if the "wake" was being continued. The Fiscal explained that this was the first prosecution under the new Public Health Act in the burgh, although similar cases had been reported to the Sanitary Department.

For the defence it was contended that the men and women "held the wake" in the absence of Docherty, who only returned from Glasgow shortly before the second visit of the Sanitary Inspectors.

Bailie SMITH explained that the maximum penalty under the new Act was five guineas, but as this was the first prosecution he modified the fine to a guinea, with the alternative of a fortnight's imprisonment.

Correspondence.

We do not in any way hold ourselves responsib'e for opinions expressed by our correspondents.

SALFORD SEWAGE EXPERIMENTS.

(*To the Editor of* THE SANITARY RECORD.)

SIR,—I note with very great pleasure your editorial remarks in THE SANITARY RECORD of March 4th with regard to my paper on "The Present Position of the Sewage Purification Problem," and I regret that the analyses which were given in my paper were omitted by the reporter, probably owing to the limitation placed upon him with regard to space.

In reply to your suggestions, I take the opportunity of sending you the following additional information with regard to the experiments in sewage purification carried on by the Salford Corporation under the direction of Mr. Joseph Corbett, Borough Engineer, together with the summary of such analyses as are at my disposal.

I may premise by saying that the River Conservancy Committee decided at an early date to carry on the experiment for their own information, and not as a national experiment carried on at the expense of the ratepayers of their own borough, hence the analyses have not been tabulated and published with the great care and voluminousness which have characterised the experiments carried on by the Massachusetts State Board of Health; and I am therefore prohibited from sending you details of the weekly analyses which have been taken for a long period of years.

The filtration of sewage on bacterial lines was commenced by Salford in February, 1893, or, in other words, soon after the publication of the Massachusetts Report, and Mr. Corbett, in advising his Committee to experiment on these filters, took up the work at the point at which that report left off. He believed that a very great deal of ventilation was essential to successful artificial filtration.

His first set of filters were, therefore, constructed in three heights, with a ventilation floor between each 20in. of filtering material, as described in THE SANITARY RECORD of February 25th, page 199, column 1.

The result of fifteen months' working, taking the average of a large number of analyses in parts per 100,000, was as follows :—

Solids in solution	88·00
Solids in suspension	0·
Free ammonia	1·29
Albuminoid ammonia	0·13

And this is considered to be a very successful result.

The tank effluent was applied at the rate of 1000 gallons per square yard for twenty-four hours alternate days, thus averaging 500 gallons per yard per day.

In July, 1895, the two filters 8ft. deep were constructed—page 199, column 2. Filter "E" had an area of $11\frac{2}{9}$ super yards, and contained four beds of small cinders from $\frac{1}{8}$in. to $\frac{7}{16}$in. in diameter, and 20in. thick, with three intermediate ventilated floors with spaces $4\frac{1}{2}$in. each, a total depth of 8ft.; filter "F" was the same area, and contained cinders of the same size, but in one mass 8ft. deep.

Each filter-bed rested on an open floor, with free outlet for air and water.

The analyses at my disposal date from May 2nd to October 10th, 1896, showing an average of about seventy-two hours' work per week, except when stopped for alterations to pipes, &c., at the rate of 500 gallons per square yard per day of 12 hours:—

	"E"	"F"	
Oxygen required in 4 hours	·843 ...	·768	per 100,000.
Free ammonia	·67 ...	·577	,,
Albuminoid ammonia ...	·188 ...	·165	,,

In the autumn of 1896 the Committee decided to test these filters to their utmost capacity, or to the point of destruction, and from October 12th for about twelve months, the filters were run practically continuously, the only stoppages being owing to the oiling and repair of machinery, and the average number of hours of work being over 160 per week. The analyses at my disposal date from October 12th, 1896, to April 1st, 1897, and the average of these is as follows :—

	"E"	"F"	
Oxygen required in 4 hrs.	·943	·837	per 100,000
Free ammonia...	1·15	·94	ditto.
Aluminoid ammonia ...	·184	·175	ditto.

Since the conclusion of that experiment, the filters were run for a short time at 500 gallons per square yard, and since then at 700 gallons per square yard.

It should be noted that while these filtration experiments have been in progress a large number of precipitation processes have been tried simul-

taneously, and the majority of these were, of course, unsuccessful, yet the effluents passed into these filters and were dealt with satisfactorily. I have no available figures as to the percentage of purification; Mr. Corbett has no doubt whatever but that the percentage of purification will be very high; but it will, of course, be seen that with an exceedingly bad tank effluent, highly charged with chemicals, the action of the bacterial filters will be considerably handicapped, and the analysis of the filtrate correspondingly unsatisfactory; these are included in the above averages.

The averages of monthly filtration tests between 1885 and 1887 are as follows :—

Free ammonia	0·483	in parts per 100,000.
Albuminoid ammonia ...	0·137	ditto
Oxygen absorbed in 4 hrs.	0·625	ditto

As a corroboration of these analyses I include an extract from the report dated 18th March, 1898, by the Rivers Committee of the Manchester Corporation.

The Manchester Committee visited the Salford sewage works on the 13th January, and took samples of the sewage, the tank effluent and filtrate, and the following is the report of their chemist :—

Salford Sewage Works,
January 13th, 1898.

DESCRIPTION OF SAMPLES.

Salford sewage, 4.5 p.m.—Blackish-grey, turbid liquid, with blackish-grey deposit

Pendleton sewage, 4.5 p.m.—Purplish turbid liquid, brownish-purple deposit.

Tank effluent, 4.5 p.m.—Liquid has brownish-purple colour, slight brown suspended matter; smells of some chemical refuse; is strongly alkaline.

Roughing filter, 4.15 p.m.—Slightly coloured and slight turbidity.

Final filter, 4.20 p.m.—Bright, clear, and colourless, no smell.

Analytical Numbers.

	Grains per gallon. Oxygen absorbed four hours.	Free and Saline Ammonia.	Albuminoid Ammonia.	Chlorine.
Salford sewage (shaken)	5·28	2·00	·50	—
(settled)	3·88	1·80	·34	10·4
Pendleton ,, (shaken)	7·58	1·40	·75	—
(settled)	5·86	1·60	·34	17·2
Tank effluent...	3·16	1·20	·23	17·0
Roughing filter	2·58	1·10	·22	16·2
Final filter	·60	·48	·06	—

Incuba'or Tests.—Three minutes' Oxygen absorption.

	Grains per gallon. before Incubator.	after Incubator.	Putrescibility.
Salford sewage...	1·44	1·92	Putrid in 5 days.
Pendleton ,, ...	1·54	2·00	Putrid in 5 days.
Tank effluent ...	1·12	1·05	Very slight smell after 5 days.
Roughing filter...	·86	·74	Very slight smell after 5 days.
Final filter	Not determined, as quantity insufficient.		Quite sweet.

In reply to your criticism as to the amount of sewage treated as exceeding in a very unaccountable measure that done by any other biological filters, of which you are aware; it was recognised as long ago as the first report of the Commissioners appointed in 1868 to inquire into the best means of preventing the pollution of rivers (Mersey and Ribble Basins), Vol. 1, 1870, page 64, that the quantity per cubic yard is the index of capacity of filters, and not the quantity per square yard, and on considering the figures given it will be found that they are not so very abnormal :—

	Gallons.			Gallons.	
Mr. Dibdin's filters	206½	at 3′ 6″	deep =	177	per c. yd.
Salford filters... ...	500	,, 8′ 0″	,, =	187½	,,
,, ...	1000	,, 8′ 0″	,, =	375	,,
,, ...	700	,, 8′ 0″	,, =	262½	,,
London Water Co's as quoted by you	540	per sq. yd.	=	?	,,

The special point of Mr. Corbett's filters is that the filters, like the Massachusetts, are throughout their whole depth open to the free and uninterrupted passage of sewage and fresh air; in contradistinction to the system introduced by Mr. Dibdin, where the filter is water-logged (especially the lower layers) for hours at a time.

So satisfied is the Salford Corporation with the efficiency of bacterial filters, that they have decided to lay down a sufficient area of these filters to deal with the whole of the Salford sewage at the rate of 500 gallons per square yard, on a filter 5ft. deep, or at the rate of 278 gallons per cubic yard of filtration material; and although the Local Government Board have refused to sanction the scheme unless the Corporation included a sum to cover the purchase of land over which the filter effluent might be turned and further purified, they have arranged to borrow £80,000 under Sec. 235 of the Public Health Act, 1875, and to construct the works without the necessity for obtaining the sanction of the Local Government Board.

It is interesting to remark that since my paper was read (I cannot claim it as a consequence of my paper) the Local Government Board has shown itself on the verge of being aroused from its state of "agnostical immobility," and has announced in Parliament that they have decided to appoint a Commission to examine the claims of efficiency on the part of bacterial filters.—Yours faithfully,

H. Gilbert Whyatt,
Assoc. M. Inst. C.E., M. San. I.,
Deputy Borough Engineer.
Town Hall, Salford, March 30th, 1898.

SEWAGE DISPOSAL AND WHEAT GROWING.

Sir,—The following account of an experiment in wheat growing is given by Mr. Brown, Smithy Farm, Congleton, as a result of using the product of the natural method of sewage disposal now firmly established at Congleton.

Mr. Brown carried out the experiment for his own satisfaction, having used the same product for years very successfully on other crops. The wheat experiment was on two acres, the produce of which was kept separate. The wheat from 9½ acres was thrashed on the 4th inst., and I here give the farmer's own words as to the results :—

"The 7½ acres of wheat grown in the ordinary way of manuring and rotation course yielded 8¼ bags of 12 scores per acre. The two acres which had been dressed with the Congleton manure (no

other manure used) yielded 12½ bags of 12 scores per acre, so that the absolute difference is 4½ bags per acre—over 50 per cent. more. There is no doubt in my mind that the excretions contained in the peat manure is the food *par excellence* for wheat."

I may here explain that the 17 bushels of wheat "extra yield" was produced at a cost of 15s. for manure, or less than 1s. per bushel; and that the expense in sowing, reaping, and threshing, was practically the same as for the poorer crop. When we consider that London destroys annually what would produce fifty million bushels of wheat, which London could restore to the farmer at a cost of 1s. per bushel for the wheat produced, we are forced to the conclusion that no sin could have been greater against nature. The farmer cannot help himself in this matter. He is practically asked to produce calico without cotton. His whole duty is to feed the teeming populations of our great cities, and he naturally looks to the cities for his necessary raw material in return. They offer him, not bread for his co-workers in nature (the bacteria of the soil) but stones. What, then, would be the consequence if the vast stores of raw material (the base things of the world which are despised) which the insatiable maw of the ocean now swallows were made accessible to the British farmer? Who can limit the increase of national wealth, national employment, and national home-grown food which would accrue to our country, if a true natural method of sewage disposal were established in place of the many tinkering artificial devices by which man's 'prentice hand has tried in vain to improve on nature, both as regards "artificial" manures and 'artificial" methods of sewage disposal?—Yours faithfully,

WILLIAM BOWLER.

Longsight, March 31st.

Notes and Queries.

Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C.

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

1024.—SLAUGHTER-HOUSES: LICENSING AND REGISTERING OF.—"Subscriber" writes:—"With regard to the Powers of an Urban Sanitary Authority to license slaughter-houses, will you please advise (1) whether a slaughter-house in use before the passing of the Public Health Act, 1875, is held to be a registered slaughter-house? (2) If not, in what year were Urban Authorities first empowered to license slaughter-houses? The Towns Improvement Clauses Act, 1847, Section 126, refers to a special Act, the section reading that no slaughter-house shall be used (unless licensed) unless it was in use and occupation before the passing of the Special Act. Which is the Special Act referred to in this section?"

Answer.—(1) Slaughter-houses in use and occupation at the time of the passing of the Public Health Act, 1875, and so continued ever since, are required to be registered only as distinguished from licensed. (2) The Special Act has now to be read as the Public Health Act, 1875. In districts where the Public Health Acts Amendment Act, 1890, has been adopted, the provisions of Secs. 29—31 should not be overlooked.

1025.—DRAWINGS ON TRACING CLOTH: HOW TO MAKE.—"Amateur" writes:—"In making drawings on tracing cloth, I find that the ink does not flow freely, and suppose there must be something to mix with the ink or put on the paper. Will you please advise me what can be done?"

Answer.—Tracing cloth may be obtained glazed on both sides or on one side only. If the latter be used the tracing should be made on the unglazed side, and the colouring done on the glazed side. Where, however, the glazed side is to be used for the tracing, the difficulty of getting the ink to flow freely may be overcome by rubbing dry powdered whiting over the surface with a piece of rag. The whiting must, however, be all dusted off the surface before using the ink, or any whiting not removed will clog the pen. Another method adopted by draughtsmen is to use a little prepared ox gall (obtainable from any chemist), which is rubbed up with the ink, although when the ink is good and freshly made this is not generally necessary. For colouring the back of the tracing a little ox gall rubbed up with the colour will cause it to flow freely and evenly over the surface. Higgins' prepared liquid Indian ink, and Higgins' coloured inks, price 1s. per bottle, we may incidentally mention, will be found much more convenient than ink obtainable from cakes. These may be obtained from Messrs. J. Halden and Co., 8, Great Chapel-street, Westminster, S.W., and 8, Albert-square, Manchester, the well-known manufacturers of surveying instruments and apparatus.

1026.—HOUSES WITHOUT SUFFICIENT WATER-CLOSETS; DEFECTIVE DRAINAGE: PROCEDURE.—"F. J. A." writes:—"In this district we have a gentleman who is the owner of thirty-six houses in one street. The houses are divided into four blocks—of eight, five, eleven, and twelve houses respectively. My committee (after hearing the reports of the Medical Officer of Health) have instructed me to serve a notice or notices on the owner to put the property into a proper sanitary condition, and to pull down the present defective and insufficient privy and ashpit accommodation and substitute therefor the water carriage system. (1) Can the whole of the property be dealt with under one notice, or must I serve four notices, dealing with each block separately, or would it be necessary to serve a notice for each house? At present one privy serves for two houses, and there are sufficient privies in point of number, but they are not sufficient in a sanitary sense, as both privies and ashpits are built with 4½in. brick walls, liquid soaks through them, and they are generally in a very unsatisfactory state. (2) Have my Authority the power to insist upon water-closets (either slop or cistern-flushed) being provided in place of the privies and ashpits above described? I am aware we cannot specify which kind of water-closet shall be provided, this being at the discretion of the owner. (3) Can the whole of the insanitary arrangements of the property be dealt with upon one notice, or is it necessary to serve one dealing with privies and ashpits, another with asphalting the yards, another with the drainage?"

Answer.—(1) We should advise that a statutory notice be served in respect to each house. (2) Providing the Local Authority have not adopted a general rule requiring that water-closets shall be substituted for privies, and have inquired into the particular circumstances of each case and the particular requirements of each house, they may, if satisfied of the insufficiency of the privy accommodation from a sanitary point of view, require the provision of water-closets under Sec. 36 of the Public Health Act, 1875. In Wood *v.* Mayor, &c., of Widnes, 61 J.P., 647, it was held that a Local Authority have no power under Sec. 36 of the Act of 1875 to enforce as a general rule throughout their whole district or any part of their district the substitution of water-closets on a particular system. They must exercise their discretion upon the report of their surveyor or inspector of nuisances in

each particular case, and can only require the provision of a sufficient water-closet, &c., as the case may require, sufficient, that is, in a sanitary sense, having regard to the requirements of the particular case. (3) If the Local Authority elect to proceed under Sec. 94 of the Act in respect to the defective sanitary condition of the houses generally, they may do so, when one notice in respect to each house for defective (*a*) privy accommodation, (*b*) drainage and (*c*) yard paving, would be sufficient. Otherwise notices must be served separately if proceedings are intended to be taken under Sec. 23 for defective drainage, Sec. 36 for insufficient water-closet accommodation, and under Sec. 94 for defective yard paving. If the Public Health Acts Amendment Act, 1890, has been adopted the Local Authority may by bye-laws enforce the paving of yards to old as well as to new houses.

1027.—SURVEYORS' AND SANITARY INSPECTORS' APPOINTMENTS, &C.—"G. E. L." writes:—"I am desirous of gaining a post as Sanitary Inspector and Surveyor combined, and shall be grateful if you will answer me the following questions:—(1) What examinations have to be passed in order to qualify for these posts? (2) What are the best means of acquiring the necessary knowledge for these examinations? (3) How long will it take to complete the studies? (4) What is the average salary for the combined post of Sanitary Inspector and Surveyor? (5) Is there a good opening in the profession for energetic men? (6) Are there any limits as to age, &c.?

Answer.—(1) Unless a person has been trained in a Surveyor's office, and has had practical experience of the work and duties of a Surveyor to a Local Authority, he would find it almost impossible to secure a post as Surveyor to an Urban or Rural Sanitary Authority. He might, however, qualify himself for the examination of the Sanitary Institute for the certificate of an Inspector of Nuisances. (2) Probably the best way of obtaining the necessary knowledge for the Inspector's examination would be by taking a course of study under any one of the gentlemen who "coach" for these examinations, advertisements as to which will be found in THE SANITARY RECORD. (3) This will depend greatly upon the student himself, but may be taken as between four and twelve months. (4) Probably £120 for the combined office, but we have no means of ascertaining definitely. (5) Whenever a vacancy occurs there is always a large number of applicants for the post. (6) A person cannot be appointed to such a post if he is under twenty-one years of age, and generally advertisements for Inspectors prescribe that candidates must not be over forty years of age.

1028.—SANITARY INSTITUTE EXAMINATIONS: QUALIFICATIONS.—"Student" writes:—"Having gone through a course of studies with a practical Sanitary Engineer, I am doubtful as to whether I should present myself for examination at the London May Examination of the Sanitary Institute. My biggest drawback is that I cannot sketch; but setting that aside, I think I could probably get through. I have been working very hard for six months. Would you advise me to postpone presenting myself until December?"

Answer.—We can scarcely, we think, be expected to decide on the chances of candidates passing examinations, as we have no means of knowing their qualifications or knowledge, and such questions should be addressed to the professional "coach" who prepares pupils for examinations. Moreover, the information is not of general interest to our readers. If the candidate, in this instance, has procured "Model Answers to the Examination Questions for Sanitary Inspectors," price 2s., published by the Sanitary Publishing Company, and which should be in the hands of all candidates, and he is enabled to answer the questions in a manner closely approaching the answers therein given, notwithstanding his inability to sketch accurately, which is no doubt a serious defect, he may nevertheless be advised to sit at the forthcoming examination in May. If he fails at this examination, he may then present himself at the December examination on payment of half fees on giving the usual notice.

1029.—HOUSING OF THE WORKING CLASSES ACT, 1890: PROCEDURE FOR CLOSING HOUSES.—"M.O.H." writes:—"Kindly inform me if it is necessary to describe the work required to be done when a notice under Form A, Schedule IV., of the above Act, is served upon the owner of a house unfit for human habitation. Can you give me a case where the point has been raised? If so, where can I get the report of it?"

Answer.—In proceedings under Sec. 32, Sub-section 2, of the Housing of the Working Classes Act, 1890, which may be taken for the express purpose of causing the dwelling-house to be closed, the form of notice prescribed (Form A, Schedule IV.), does not specify any work required to be done, and it appears to be impossible to contend that it should do so. If proceedings, however, be taken under Sec. 32, Sub-section 1, of the Act, the first step in the procedure is to give notice to the owner to carry out such works as may be necessary to put the house in proper condition, and on his failure to do so to apply to justices for a closing order. The form of notice under Sec. 32, Sub-section 1, will be similar to that under Sec. 94 of the Public Health Act, 1875. Our correspondent will find in the notes under Sec. 94, in Lumley's "Public Health," a number of cases bearing on the point raised by him. If, however, he is advising his Authority to take proceedings for the express purpose of closing the house, these should be taken under Sec. 32 (2) of the Housing of the Working Classes Act, 1890.

1030.—CONSERVATORY: PLANS OF: REQUIRED UNDER BYE-LAWS.—"E. G." writes: "Could you tell me whether it is compulsory to submit plan of conservatory to a Local Authority? The building is to be heated by hot water, and will be built adjacent to a detached house, but with no direct communication with the interior of the house. I have been given to understand that such buildings are exempt so far as submitting plans to Council are concerned."

Answer.—The building referred to will not be exempt from the operation of the Building Bye-laws, and plans should be submitted to the Local Authority. The exemption only extends to "buildings erected and used, or intended to be erected and used, exclusively for the purposes of a plant-house, orchard-house, summer-house, poultry-house, or aviary, *which shall be wholly detached, and at a distance of 10ft. at the least from any other building*, and which shall not be heated otherwise than by hot water, and in which the fireplaces (if any) shall be detached, with no flues of any kind within such plant-house, orchard-house, summer-house, poultry-house or aviary." The building proposed to be erected does not comply with the requirements of this clause, and is therefore, as we have said, not exempt.

1031.—BUILDING LINE: AUTHORITY CANNOT PRESCRIBE FOR BACK WALLS OF HOUSES.—"R. W. G." writes:—"Am I correct in saying that an Urban Council have power to make the architect of a proposed new building set back the walls of the building at the back of the house, so as to keep them in line with the adjoining buildings? The architect wishes to bring out the new building 4ft. beyond the line of existing adjoining building, and thinks he has power to do so. Please give me your opinion. I enclose page of bye-laws *re* air space, and should thank you for your expression of opinion."

Answer.—Neither an Urban nor a Rural Sanitary Authority have any power to enforce a building line for the back walls of houses when these abut on yard spaces. The Building Bye-laws do not apply to such cases except so far as to prescribe the amount of open space which must be provided, and the minimum distance of space to

be allowed between the rearmost wall of the domestic building and the boundary of the premises. Sec. 3 of Public Health (Buildings in Streets) Act, 1888, applies and prescribes that "it shall not be lawful in any urban district, without the written consent of the Urban Authority, to erect and bring forward any house or building in any street or any part of such house or building beyond the front main wall of the house or building on either side thereof in the same street, nor to build any addition to any house or building beyond the front main wall of the house or building on either side of the same." It must be observed that the section is restricted to the *front* wall of buildings, and not to cases such as that mentioned by our correspondent. If the plan complies with the requirements as to open space at rear, and is not otherwise in contravention of any bye-law, the Urban Authority will not be enabled to refuse approval of the same.

1032.—LEGAL PROCEEDINGS: NOTICES BY SURVEYOR OR SANITARY INSPECTOR INSUFFICIENT.—"X. Y. Z." writes:—"In a county borough can any of the following officials prosecute before they have laid their case before their Committee or Council, and received their instructions to do so, viz.:—(1) The Surveyor to the Authority, when a person erects a building contrary to the building bye-laws; (2) an Inspector of Nuisances, when a person refuses to comply with an order for the abatement of a nuisance; (3) an Inspector under the Food and Drugs Act, when he discovers a contravention of that Act has been committed? If they can do so, under what Acts, or sections of same, have they the power? If not, have any cases been decided in any courts against them? Further, can a Council, by special resolution, give them the power, and, if so, under what Act and section?"

Answer.—(1) and (2) In neither case can legal proceedings be instituted, except and until the complaint has been laid before the Local Authority, and they have determined to prosecute. Under the Building Bye-laws it is the Council who are to institute proceedings, and under Sec. 94 of the Public Health Act, 1875, it is the Local Authority who must issue the notice. Neither the Surveyor nor the Inspector is the Council or Local Authority, and any legal proceedings instituted by them, without the complaint having been first reported to the Local Authority would fail. (See Vestry of St. Leonard's, Shoreditch, *v.* Holmes, 50 J. P., 132.) (3) An Inspector under the Food and Drugs Act, appointed by a County Council, will, we are of opinion, be enabled to prosecute for offences under the Act without the direction of the body appointing him.

1033.—OLD HIGHWAY BECOMING NEW STREET UNDER BYE-LAWS.—"Gus" writes:—"I send you tracing," (not reproduced) "showing plans of buildings proposed to be erected on land adjacent to a public highway, which latter is only 26ft. 9in. in width at this point. Immediately beyond this point the road is a private street, laid out the full width according to the bye-laws. I shall be glad to be informed whether the Council have the power to compel the owner to set back his building line 18ft. from the centre of the existing highway, and if so, whether under the circumstances you could take the centre as being midway between the forecourt wall and the fence on the opposite side of the road, or from the outer edge of kerb to the opposite fence. My Council have not yet adopted new bye-laws as an Urban Council,

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but are working under the bye-laws of the Rural Authority of which they formerly formed a part. A copy of the bye-laws is enclosed."

Answer.—The question as to when an old highway becomes a new street, to which the Bye-laws as to width of Streets apply, is always a question of fact. An ancient highway, it has been decided over and over again, may become a new street within the meaning of Sec. 157 of the Public Health Act, 1875, and the bye-laws made thereunder. (See Robinson *v.* Barton Local Board, 21 Ch. D., 632, &c.) In the case named by our correspondent, the bye-laws of the Rural Sanitary Authority are exercisable under Sec. 275 of the Act of 1875 by the present Urban Sanitary Authority. These bye-laws prescribe that new streets must be of a width of 36ft. Taking into consideration the circumstances of the case, we are of opinion that the Local Authority will be enabled to require the forecourt wall to the proposed new houses to be set back a distance of 18ft. from the centre of the old highway.

Vacancies.

BUILDING INSPECTOR (LITHERLAND, LANCS, April 16th).—For the Urban District Council. Salary £110 per annum. Messrs. North, Kirk, and Cornett, clerks to the Council, 15, Lord-street, Liverpool.

ELECTRICAL ENGINEER (DEWSBURY, April 9th).—For the Corporation. Salary £250 per annum. Mr. G. Trevelyan Lee, town clerk, Town Hall, Dewsbury.

SURVEYOR, &C. (SWADLINCOTE, April 11th).—For the Swadlincote District Urban District Council. Salary £200 per annum. Mr. W. A. Musson, clerk, Market-street, Ashby-de-la-Zouch.

Contracts Open.

The dates given below are the latest up to which tenders can be received.

POKESDOWN (NEAR BOURNEMOUTH).—April 9th.—Sewers, &c.—Mr. Edward Wembridge Ingamells, engineer and surveyor, Council Offices, Pokesdown, Bournemouth.

CHURCH (LANCS).—April 11th.—Sewering.—The Surveyor, Urban District Council Office, Church.

DUKINFIELD. — April 12th.— Sewage Purification Works.—Messrs. Newton, 17, Cooper-street, Manchester.

WEDNESFIELD.—April 14th.—Sewerage Works.—Mr. R. E. W. Berrington, 1, 2, and 3, Bank-buildings, Lichfield-street, Wolverhampton.

ULVERSTON.—April 13th.—Sewerage Works.—Mr. Joseph Greenwood, Union Offices, Ulverston.

WASHINGTON (DURHAM).—April 13th.—Sewers.—Mr. George Lymon, surveyor, Birtley.

METHLEY (YORKS). — April 18th. — Sewers.—John Richardson, Esq., J.P., Methley Park, Leeds.

COMPETITIONS.

CRICKLADE (WILTS), April 30th.—Water Supply Plans.—The Cricklade and Wootton Bassett Rural District Council invite engineers to forward a report, with plans and estimates, for furnishing an effective system of water supply to the town of Cricklade, Wilts, exclusive of the cost of the land or easements, but inclusive of all other expenses. Premiums of £21 and £10 10s. will be given for the plans which the Council shall adjudge to be first and second in order of merit. Mr. Harry Bevir, clerk, Union Offices, Wootton Bassett.

FORMBY (LANCS), July 1st.—Sewerage Scheme.—The Formby Parochial Committee invite competitive schemes for the sewerage of a portion of the township of Formby. Premiums are offered amounting to £100 for the scheme considered first in order of merit, £50 for the second, and £25 for the third. Mr. J. H. Havelock Sutton, Piercefield-road, Formby. A professional assessor will be appointed to adjudicate upon the plans.

DR. ERNEST HART.—The will, which is dated January 3rd, 1898, of Dr. Ernest Abraham Hart, of Fairlawn, Totteridge, M.R.C.S., editor of the *British Medical Journal*, who died on January 7th last, aged sixty-two years, has been proved by his widow, Mrs. Alice Marion Hart (daughter of Mr. Alexander Rowland), Mr. Stephen Simon Hyam, of Finsbury-pavement, solicitor, and Sir Ernest Clarke, of 13, Hanover-square. The testator's personal estate has been valued at £15,966 6s. 11d. gross and £12,114 18s. 11d. net.

WORSHIPFUL COMPANY OF PLUMBERS.—At a public meeting held at the Town Hall, Durham, the following resolution was carried unanimously:—"That this annual general meeting of the North of England District Council for the National Registration of Plumbers is of opinion that an organised and efficient system of registration of qualified plumbers is essential to the protection and preservation of the health of the community, and records its approval of legislative sanction being given to the registration movement, and its desire that the members of Parliament in the district will support the Bill now before the House of Commons."

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The unpleasant effects produced in some constitutions by tea and coffee are believed to be due to small quantities of volatile ingredients contained in them. But there is a seed which is largely used in Central and Northern Africa, and which contains the same active principle as tea and coffee, but without any injurious ingredient whatever. This is the Kola nut. It is nearly allied to cocoa, since it belongs to the same natural order of plants, and contains also the same active principle as cocoa, viz., theobromine. It has, however, not the agreeable flavour of cocoa but a rather insipid taste.

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As attempts have been made by ignorant persons to depreciate, apparently for business purposes of their own, the value of Kola, reference is made here to a few of the large number of published statements by competent authorities on the subject.

Dr. Daniel, who lived for some time at Sierra Leone, states in the *Pharmaceutical Journal* (1865 (2), vol. xi., p. 450—456) :—"It would be difficult to find any product which occupies such an exalted position in the social and dietetic economy of the Negro tribes, and which constitutes such an important article of commerce in the Soudan as the Kola nut. . . . For many years these valuable commodities have been offered for sale in the markets of Fez, Tripoli, and other depôts on the shores of the Mediterranean. . . . One remarkable feature, worthy of attention, is the marked avidity displayed by the Negro inhabitants of Sierra Leone and the Portuguese colonies for the nuts in preference to the beverages of tea and coffee, although these contain the same alkaloid."

The high importance of Kola has been recognised by the Kew Authorities, by whom this statement is made :—(*Kew Bulletin*, November, 1890, p. 254)—"From 1880 onwards, the Kola plant has been propagated at Kew, and steadily distributed from there."

Sir Alfred Moloney, C.M.G., speaks very highly of the Kola nut in his "Forestry of West Africa," page 162, and remarks, "Attention to its development is indeed small compared with what may prove to be the importance any demand for the Kola in the future, whether as Kola chocolate, or in view of the steady spread of Mohammedanism from North-East Africa towards the West, to meet the proportionately increasing want by its followers, of a stimulant other than that resulting from the degrading and degenerating use, more frequently than not in excess, of imported spirit appropriately called the 'fire-water' of the white man."

Mr. Peter Boa records in the *Pharmaceutical Journal* (April 1892, page 842) a candid and evidently unbiassed opinion concerning Kola nuts as follows :—"My own experience of Kola is that as a beverage, say, for breakfast use, its effects last longer than the effects of tea and coffee similarly taken." He adds further, "Mr. Henry had some experience of the stimulating and sustaining effects of Kola during walking expeditions, and similar prolonged exercise. Its effects were similar to cocoa, but it possessed the advantage of warding off the pangs of hunger."

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THE

Sanitary Record,

APRIL 15, 1898.

POWERS OF LOCAL AUTHORITIES IN REGARD TO WATER-CLOSET ACCOMMODATION.

THERE have been two cases recently decided in the Courts on this subject, which should serve as useful guidance to Local Authorities in the exercise of their powers in enforcing the provision of sufficient water-closet accommodation; or, more properly, in enforcing the substitution of water-closets for privies, under Sec. 36 of the Public Health Act, 1875.

The first case to which we refer is Wood *v.* Mayor, &c., of Widnes, in the Queen's Bench Division, on July 24th last (61 J.P. 646), and which was carried to the Court of Appeal January 26th, 1898 (62 J.P. 84). In this case the Local Authority had passed a general resolution on the 12th February, 1895, which was to the effect that, "in all future cases of nuisances regarding the reconstruction of privies and ashpits, the Local Authority of this borough do, as far as practicable, order that such privies and ashpits be converted into the waste-water closet system, or into such other system as the Local Authority may from time to time approve, and that the Highway, &c., Committee be requested to take such steps for the adoption of the first-named system generally throughout the borough."

Subsequent to this resolution the officers of the Local Authority reported that a large number of houses in a particular district of the borough, and numbered in batches consecutively, were without sufficient water-closets. Notices were then given by the Local Authority to the owners, requiring water-closets to be provided on the waste-water closet system, in accordance with plans and specifications which it was stated by the notice could be seen at the office of the borough surveyor, such notices not being given in respect of each house, but in respect of whole batches of houses at a time, and not condescending, as Ridley, J., pointed out, to deal with the different requirements of different houses. He also observed, as did Lawrence, J., that a Local Authority are not entitled to say, "You shall have a water-closet of a particular pattern, or a particular size, or on any particular system." If the owner provides a sufficient water-closet, that is, a water-closet which is sufficient in a sanitary sense, that is all that the Local Authority have the right to call upon the owner to do. Here the Local Authority had made a general rule for the substitution of water-closets on a particular system in the place of privies, and that was against all the authorities. Lawrence, J., held that the resolution of the Council of the 12th February, 1895, was not valid, and that it invalidated all subsequent proceedings, and Ridley, J., held that the discretion of the Local Authority, under Section 36 of the Public Health Act, 1875, ought to be exercised in each case with regard to the circumstances of that particular case, and the owner or occupier ought to have the opportunity of choosing for himself the kind of w.c. he will have subject to the necessity that it should be a sufficient w.c. within the meaning of the Act of Parliament; sufficient, that is, in a particular sense, of which the Local Authority are to be the judges, having regard to the requirements of the particular sense. This case was carried by the Local Authority to the Court of Appeal (62 J.P. 84), but the appeal was dismissed, the Court holding that the Corporation had not considered the requirements of each individual house, but had acted in pursuance of a general scheme.

The second case to which we refer is that of Robinson *v.* Mayor, Aldermen, and Burgesses of Sunderland, and came on for trial before Ridley, J., at the Durham Assizes on March 4th (62 J.P. 216), and was an action brought by the owner claiming an injunction restraining the Corporation, their servants, &c., from entering upon his premises for the purpose of doing the works specified in a notice calling upon him to provide a sufficient water-closet to a certain house within the district of the borough.

This case differed from Wood *v.* Mayor, &c., of Widnes in that the Corporation had not passed

a general resolution to the effect that the water-closet system should be substituted for privies, &c. But the Corporation, however, had required by their notice that the owner should provide a sufficient water-closet to the house, according to a particular specification given by the notice. Ridley, J., held that the plaintiff was entitled to succeed on the ground that the Corporation required him to supply one particular kind of water-closet, when they ought simply to have required him to supply a sufficient one.

These cases, as we pointed out earlier, will serve as a guidance to Local Authorities in proceeding under the provisions of Sec. 36 of the Act of 1875; and we doubt not that Authorities henceforth will avoid proceeding (1) by way of a general resolution to enforce the substitution of water-closets for privies, and (2) by requiring a water-closet of any particular pattern or system to be provided. It will be advisable, we are of opinion, for those Authorities which have such a general resolution on their minutes to have the same rescinded before taking further proceedings thereunder, in order to avoid litigation, which it is evident can only have one result, and that is against the Local Authority.

Notes.

Food Adulteration.

It is abundantly manifest that opinion in the provision trade and the other interests concerned with regard to the proposed changes in the law relating to food adulteration is in a very unsettled state. Less than a month ago we had occasion to note Mr. Chaplin's reception of a strong deputation from the Federation of the Grocers' Associations of the United Kingdom. That deputation wished to urge on the President of the Local Government Board the desirability of amending and consolidating the Sale of Food and Drugs Acts of 1875 and 1879 and the Margarine Act of 1897, on the lines of the recommendations contained in the recent report of the Select Committee on the subject; but Mr. Chaplin was under the necessity of pointing out to them that the lack of unanimity of opinion, not only in parliamentary circles, but also within the ranks of the Federation itself, constituted a very serious difficulty in the way of the Government's legislative proposals. In particular, he instanced the divergence of views entertained by members of the Federation on the margarine question, many of them being strongly opposed to the recommendations of the Committee—that the colouring of margarine and the mixing of margarine and butter should be altogether prohibited.

A New Deputation.

And now we find another Deputation, also claiming to represent the provision trade and its allied interests all over the kingdom, waiting on Mr. Chaplin at the Local Government Board office, to urge on him the policy of non-interference with regard to the sale of margarine. Sir John Leng, M.P., who acted as principal spokesman of the Deputation, in introducing the subject pointed out that the shoal of petitions in favour of an alteration of the Food Products Bill that had lately been pouring into the House of Commons, all bore a common stamp. They clearly represented the agricultural interest. Now, it is no more than we should expect that this important question should be viewed differently by those engaged in agriculture and by the provision trade. The latter maintain that the law relating to the sale of margarine is ample, if properly enforced. But Mr. Chaplin, while promising to give all due weight to the views urged upon him, very properly reminded the deputation that, in considering what legislation was necessary, the chief consideration must be the interests of the community at large, and not those of any particular trade or industry.

The Need for an Authoritative Court of Reference.

We observe, in connection with this subject, that the *Daily Mail* has been giving prominence to the views of Dr. Bernard Dyer, not in relation to margarine simply, but on the whole question of the introduction of preservatives into food, and of food adulteration. The extent to which preservative substances are used is apparently quite unsuspected by the general public. Dr. Dyer points out that the evidence taken before the Select Committee has established that aniline dyes are now very largely employed in colouring foodstuffs, and that antiseptics are added to almost all perishable foods; and he further observes that in most continental countries the sale of food containing antiseptics is forbidden, the export of such food to this country, however, for our consumption, being freely permitted. The opinion of all the most eminent authorities, and especially of public analysts, is that the only way to deal with this question satisfactorily is to leave it to the determination of the Court of Reference to be constituted in accordance with the Select Committee's recommendations. It should be empowered to fix the food standards, and also to decide what preservatives, if any, should be used, and in what quantities—instead of leaving such matters to the varying decisions of individual magistrates, who have no other guide but the evidence that may happen to be laid before them.

Diseased Foreign Produce.

The drift of certain questions in the House of Commons by Sir Mark Stewart and others seems to point to a growing belief among British politicians that it is time that we checked the free importation of diseased foreign produce by more stringent supervision at the port of entry. Mr. T. W. Russell has admitted that at present dairy produce is imported in large quantities from countries that possess no such regulations as to dairies and cowsheds as we do. In fact, as we recently pointed out, the importation of such produce is steadily on the increase; and the only precautions that exist for the protection of the consumer are the same as in the case of home produce, viz., that Medical Officers of Health and Inspectors of Nuisances have power to examine any animal, carcase, milk, or other suspected articles deposited for sale, and to seize any which they consider unsound or unfit for human consumption. But many people now hold that the Government should adopt more rigorous precautions than these with regard to foreign pro-

duce, especially when we know that it comes from places where the most insanitary conditions prevail. For example, there is no proper system of inspection or analysis of foreign milk, and if it happens to be infected, once it is beyond the control of the Port Authorities, there is no saying what harm it may not do. The fact that we know and can control the conditions under which the home produce is supplied, and that we have no such knowledge or control with regard to foreign produce, justifies us in differentiating between them, and checking the latter at the port of entry.

Manchester and the Sewage Question.

Manchester, like many other towns, is now face to face with the difficulties of the sewage question. They have been studying the modes adopted in Sutton, Barking, Glasgow, Oldham, and elsewhere, for the treatment of sewage and the disposal of the effluent, and have decided to embark on a scheme which is to cost, it is estimated, about £170,000. Unfortunately—and in this respect their experience has been by no means singular—friction has arisen with the Local Government Board over the proposed loan, and in particular with regard to the Board's preliminary requirement that more land should be acquired for dealing with the sewage effluent by means of irrigation. On this question the Rivers Committee of the City Council are at direct issue with the Board. They believe that for them irrigation would be not only costly, but altogether futile; whereas the scheme they advocate is, they are convinced, as the result of inquiry and personal observation, the cheapest and most effectual means now known of dealing with sewage. In the event of no compromise being possible, the Council may be under the necessity of going to Parliament for the necessary powers; but there are some who deprecate any conflict with the Local Government Board, and are in favour of holding the matter over until the report of the Royal Commission has been issued, estimates being meantime taken of the cost of construction of the proposed filters. No better illustration could be had of the necessity of this Commission, and of an authoritative pronouncement being made as soon as possible on the whole question of sewage disposal. It looks, however, as if the Council of Manchester are not very much in earnest, for at their last meeting the discussion resulted in a count out!

County Council Instruction in Dairy Work.

We are indebted to the Essex County Council for a return showing the extent to which instruction in dairy work is carried on under the auspices of County Councils. From this it appears that twenty-six counties at present employ travelling instructors, some for the whole year, others only for the principal dairying months. We find also that sixteen Councils support "fixed schools." The term must not, however, be understood to mean absolutely permanent institutions. In point of fact, the school in some places may be "fixed" at one centre for so many months in each year, or different centres may be selected in successive years, so that the benefit may be distributed over the entire county. The return also gives details as to the respective cost of these schools, but being compiled on no common principle, they differ so widely that they are statistically comparatively useless. Information is also given as to the hours of work and the staff employed. The remuneration of head teachers varies from £80 to £120 per annum.

Economic Progress of Electricity.

Mr. Hammond's paper at the recent meeting of the Institution of Electrical Engineers gave us some most interesting figures illustrating the reduction which has taken place within late years in the cost of the generation and distribution of electrical energy. In Leeds, for example, the selling price, which was 8d. per unit four years ago, is now only 4d. As to the cost per unit sold, in 1894 the lowest result was obtained by Manchester, the cost being 2·17d. per unit. We now find no fewer than fifteen towns that can show a lower cost of production, some of the principal rates being as follows:—Edinburgh, 1·13d.; Manchester, 1·45d.; Portsmouth, 1·71d.; Leeds, 1·73d.; Liverpool, 1·77d.; Bradford, 1·81d.; Glasgow, 1·92d.; Brighton, 2·04d; and so on. There are now 121 works in existence, principally for lighting purposes. These figures betoken extremely satisfactory progress. Mr. Hammond's paper was also instructive as indicating the directions in which further decrease in cost might in the future be attained.

Scottish Building Regulations.

The Convention of Scottish Burghs, at their annual meeting last week, adopted some important resolutions, some of which are of general interest to sanitarians. And the first to which we should like to draw attention is one for the establishment of a code of building regulations for all burghs in Scotland having a population exceeding 10,000. Such a code was adopted in Glasgow in 1892, under a special Act of Parliament, and it has proved of the greatest service not only to the Dean of Guild Court, but also to architects and others engaged in the building trade. The Authorities are thereby empowered to secure the proper ventilation of all blocks of houses, erected in hollow squares, by means of ventilation lanes; and the resulting benefit to the sanitation of the city has been immense. The adoption of such building regulations in crowded centres of population will prevent the recurrence of those congested areas and ill-ventilated and insanitary dwellings which are the bane of our larger towns; and experience also teaches that they have a most marked influence on the prevention of fires due to defective construction.

Sanitary Dwellings for the Poor.

Another important resolution was one in favour of obtaining powers from Parliament entitling municipalities to erect sanitary dwellings for the poorer classes. The resolution was moved by Mr. Chisholm, of Glasgow, who drew a vivid picture of the kind of houses the very poor at present inhabit—houses

situated in narrow streets, lanes, or alleys, or in back lands; with high garrets, up ricketty stairs, and even down in cellars, or what might be called such; damp, unwholesome, free from light and air; in a word, destitute of the very elementals of sanitation. The difficulty, however, experienced by all large towns in dealing with this question of the slums, arises from the high price of land, which in many cases renders almost prohibitive the attempt to provide really good, though plain, houses for the labouring population at rents that are within their means. The private builder at least will not do it, but the task is not altogether beyond the power of municipalities, with their easy command of money at low rates. Mr. Chisholm said that in Glasgow they had provided one-room houses at rents of £4 10s., and two-room houses at rents of £7, and had besides not only paid the interest on the invested money, but had also been able to carry a considerable amount to the general depreciation fund. And if it had been proved possible to do this in Glasgow, why should not municipalities in general be invested with similar powers, without the necessity of going to Parliament in each individual case?

The Midwives' Registration Bill.

At the meeting of the General Medical Council last week, when Sir William Turner, of Edinburgh, was elected president, in room of the late Sir Richard Quain, the Midwives' Registration Bill formed the principal subject of discussion. After protracted deliberations, the Council approved of the Bill, subject to certain conditions, and if these are adopted the effect of the Bill will be this—that midwives should be licensed annually, instead of being registered permanently; that a central board for the supervision of midwives should be established, which is to lay down regulations for their education and the manner in which they may practise, which must be approved by the Medical Council; that each midwife should further be under the direct supervision of the local Sanitary Authority for the district in which she resides; and that every unlicensed person who practises for gain in future should be punished. It is understood that at present considerably more than half the confinements in England are conducted by midwives, instead of by members of the medical profession, and as the question affects the well-being of more than half a million of mothers in England and Wales annually, the measure is one of very far-reaching importance.

The Consumption of Condensed Milk.

The statistics that appeared in a recent article in the *Times* showing the increased importation of condensed milk into this country, are interesting and instructive. Taking the first eight weeks of 1896, 1897, and 1898, the following quantities were received:—1896, 109,855 cwt.; 1897, 116,792 cwt,; and 1898, 152,067 cwt.; showing an increase this year of 30 per cent. over last year, and of 40 per cent over 1896. It is not unreasonable to suppose that this increased consumption of condensed milk, which is almost entirely an article of foreign manufacture, is partly, perhaps chiefly, due to the conviction which is now entertained by many people of the danger of using unsterilised milk. So many epidemics have been traced to an infected dairy, so much alarming information has been circulated as to the prevalence of turberculosis, especially in city byres—there are said to be 800,000 tuberculous cows in the country—that it is small wonder that people are growing chary of the milkman's cart, which may be, for aught they know, the vehicle of scarlet fever, consumption, or who can say what nameless forms of dread disease.

The Benefits of Sterilisation.

It is no longer necessary, however, to resort to condensed milk in order to secure the benefits of sterilisation. Many dealers at home now supply milk which has been absolutely sterilised, and will keep sweet for an indefinite time by being sealed in air-tight bottles. The necessity for this latter precaution lies in the fact that sterilisation by boiling would of itself prove but a slender security against the development of germs, unless the air were to be also afterwards excluded; for it has been shown that some germs attain their greatest activity in milk which has been boiled and subsequently exposed to the air. Be this as it may, however, it is certain that the milk which can be had in air-tight bottles is not only absolutely safe, and free from the presence of germs, but it is also as sweet and palatable, and moreover nearly as cheap, as the best fresh milk. Were this more generally known, we feel sure that the use of sterilised milk would become more common, especially for the use of infants, and there would be a marked decline in the death-rate. Some medical authorities, indeed, go so far as to say that in large towns the rate of mortality would be reduced by 50 per cent.

A Zealous Lady Sanitary Student.

We have had brought under our notice an excellent example of the spirit of zeal on the part of a student in sanitary science, which we think deserves to be recorded for the inspiration of others. It is noteworthy, too, that the student in question is a lady—there is no need to mention names. She had been studying medicine—with a view, we presume, to practising as a doctor—and had all but finished her curriculum; but she considered that her medical course would not be complete without some practical experience in the field of sanitation, for which there was no provision at the University. She therefore applied for and obtained an appointment, without a salary, on the sanitary staff of the city in which she was studying—merely for the sake of gaining experience. Were such an example to be followed by most of our young doctors, who consider that they are well qualified in public health, if they go through a certain course of study and take a diploma, but without any experience of practical work, there would be a great advance in the knowledge of hygiene. University instruction is an excellent thing; but just as no medical education is complete without experience of hospital work, so no course of hygiene should be considered complete without a certain degree of experience in the sanitary department of a large town.

THE SANITATION OF DOMESTIC BUILDINGS.

By Frank Latham, C.E., M. San. Inst, &c., Assistant Surveyor, Borough of Margate.

CHAPTER VI.

Section 3.

SINKS.

Although slop sinks (which are places where servants empty their pails) are convenient in large establishments their adoption in ordinary buildings where proper pedestal closets are provided may be dispensed with, as it is important that the number of inside connections with the house drains should be minimised as much as possible, water-closet basins being now specially manufactured with a slop top, but with a good size basin this slop

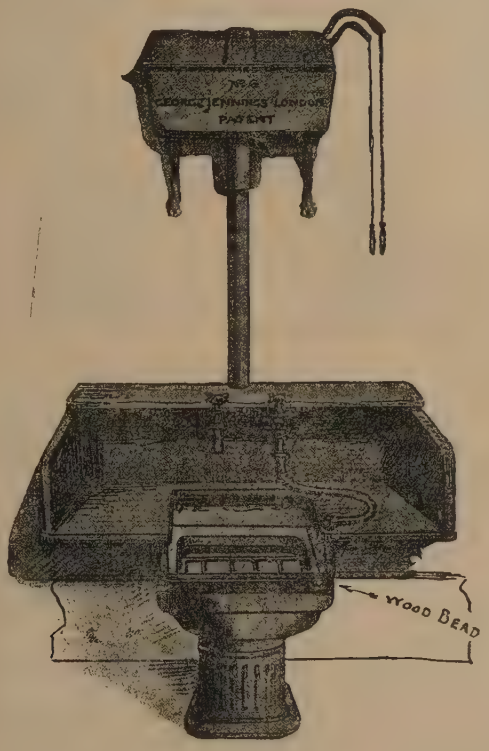

Fig 76.

sink is scarcely necessary. Slop sinks consist of an earthenware or porcelain enamelled iron basin, about the same size as that of a water-closet, and fixed in an open framing of woodwork, and connected with a special pipe by a 2½in. waste and trap similar in every way to the closet apparatus, the out-go pipe being well ventilated by means of a 2in. vent to prevent syphonage. In the top of the sink should be a slop top of the same ware also forming a flushing rim, and both sink and top manufactured in one piece (Fig. 76). A fillet of wood should be fixed in front of the sink to prevent pails coming into contact with the earthenware and breaking the apparatus. An enamelled iron grating is fixed at the bottom of the basin to prevent valuable or obstructive articles entering the drains. As in the case of closets, the inside surfaces should be washed by proper flushing apparatus, and a lead safe with waste pipe in 5lb. lead should be provided under the sink in case of spilling or overflow. It is very important that these sinks should be placed in good sanitary positions, no other situation but against an external wall with proper window to open being admissible. The method of placing them in unventilated chambers or on confined landings is specially objectionable.

Scullery and other sinks should be made impermeable, and of cleanly material adapted for the purpose intended. The waste pipe should be fixed in either the right or left-hand back corner, and the sink fixed to give a fall from all parts towards that angle so that it will drain itself. The commonly used white glazed earthenware sink with ordinary care answers as well as any, but it has its disadvantages when the household crockery, &c., comes in sharp contact with it. Wood is sometimes used as a protection for such utensils. Wood sinks lined with thick lead, or, better still, tinned copper, are recommended, and in some cases are to be preferred.

The white glazed earthenware sink is the best for washing vegetables and other articles of food in connection with the kitchen, the material being non-poisonous and easily kept clean.

Sink waste pipes should be of lead 2in. in diameter, and trapped directly under the sink by means of a syphon trap provided with brass

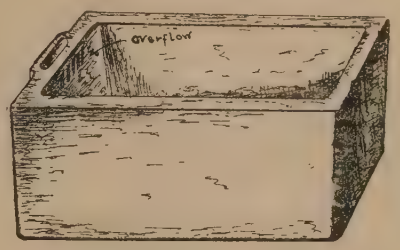

Fig. 77.

thumb-screw under, for cleansing purposes. The waste should be fixed by opening the inlet, and to ensure a fit with the outlet hole, the opened end being passed through the bottom, the pipe can be tafted over the inside of the sink, which is countersunk for that purpose. An ordinary brass grating can then, in the case of small sinks, be tafted over the waste. It is, however, necessary in the case of sinks required for washing-up purposes to adopt a brass cup grating, the cup being inserted in the opened end of the pipe in order that a plug may be used for retaining the water. In sinks of the latter description overflow pipes should either be provided in its manufacture, as in Fig. 77, or by means of a pipe connected with the waste on the house side of the trap.

Section 4.

URINALS.

The urinal is a most imperative necessity amongst sanitary fittings, and its extended use in hotels, schools, factories, and public conveniences has brought about great improvements in its construction. It is not an easy thing to contrive a sweet and cleanly urinal, and cheap ones are generally nasty. In all cases it is a matter of much consideration that the most sanitary form and service-

able value should be obtained. Urinals should be placed in well-lighted and ventilated positions, with due regard to convenience; if this rule is not kept in view, more or less, a nuisance is sure to result.

Urine is of a very corrosive nature, and will form a thick incrustation on the surfaces of an apparatus if at all neglected, even for a short period, which coating will throw off a strong and disgusting odour, besides sometimes corroding the small trap and

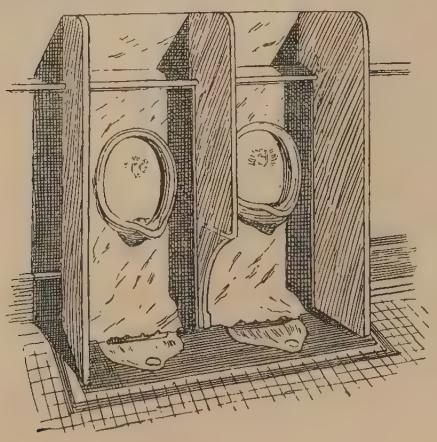

Fig. 78.

pipe found in some makes, and these being forced by some inexperienced person, will often become damaged, and the trap rendered useless, leading to the escape of drain air. Urinals, therefore, should be arranged so that they can be automatically flushed at frequent intervals with fresh water, the apparatus being also cleansed down at least once

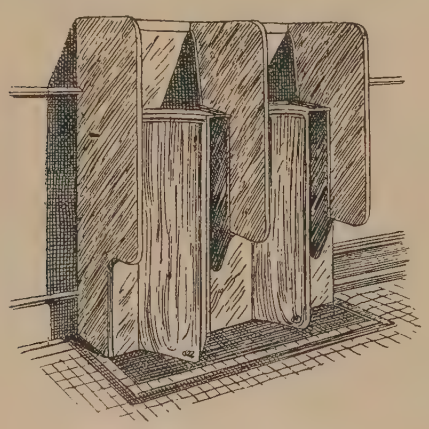

Fig. 79.

every day, and all corrosion removed. This will be found a comparatively easy matter if regularly done; when in a bad condition the use of hydrochloric acid may be necessary.

The best urinals should have no rough surfaces, unnecessary corners and joints, or any unprotected ironwork, to come in contact with urine. It is better to have no ironwork whatever, the flushing rims, &c., being either of copper or brass. The chamber floors should be tiled, cemented, or paved with impervious material, with falls towards the channels in connection with the apparatus, the urinals, together with floors and surroundings, being self-draining and easily cleansed.

There are several good patterns of urinals now in use, the most general form being an earthenware basin, containing fresh water fixed in a screened stall (Fig. 78). The water in the basin being more or less frequently changed by flushing from automatic syphon cistern or by treadle connected with a grating, which is stood upon by the person using the urinal, thus turning on the water for the time being.

In the case of the basin urinals with gratings, a proper impervious floor should be laid under the grating, with a channel leading to a gully trap, so that the whole can be properly flushed.

Some of the best forms of urinals now produced consist of stalls with cream or salt glazed ware semi-circular radials or bays, having floors of the same material, with falls towards a trap in front. The floor surrounding the urinal is laid with falls towards the same gully, so that every part can be sluiced down with fresh water, and the contents carried away down the drains (Fig. 79). These

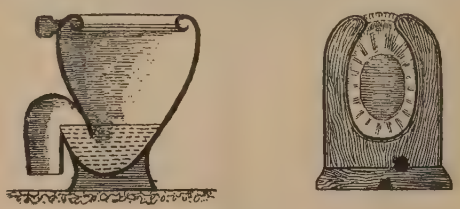

Fig. 80.

urinals are very simple and strong in construction, and should have no joints or angles to collect filth, so that they can be kept effectually clean with a small amount of attention; the floors and backs should be manufactured in one piece, thus doing away with a joint between the two. A disinfecting block, suspended in the flushing cistern, has a beneficial effect. Hope's Pynerzone blocks and suspenders for this purpose give off a pleasant odour, and maintain the lavatory compartment sweet and fresh. Urinal waste pipes should be trapped immediately after leaving the apparatus, and amply ventilated by a proper ventilation pipe and anti-syphonage before entering the drain.

A new and welcome departure in sanitary apparatus is the "Urinette" (Fig. 80). This contrivance is on the principle of a water-closet, but considerably smaller, thus requiring but little floor space; the object being its adoption in factories and such places where women are employed, and answers somewhat the same purpose as the urinal in the men's section. This apparatus is flushed in a similar manner as the urinal by means of an automatic flushing cistern, and is so designed as to work effectually if used as a water-closet. Urinettes can be divided off separately, as in the case of trough closets, and each enclosure screened by means of a special hanging curtain, which may be drawn when in use and opened when vacant.

It is expected that the Government will announce the names of the Royal Commission on the Sewage Question within the next few days.

"PRACTICAL SMOKE PREVENTION."

By W. Nicholson, Smoke Inspector, Sheffield.

The smoke question, like the poor, is ever with us, and is a problem almost as difficult of solution. Much has been written on the subject, and from many pens a stream of more or less interesting and practical matter has flowed. All who have written have presumably been actuated by the very best of motives. They have realised the nature and extent of the evil, they have witnessed the blighting effect upon the beauty of our public buildings, they have observed how it has hung like a pall over our cities, hiding out the light of the glorious sun, and contaminating the air with the particles of dirt, and how it has crippled the health, and shortened the lives of the crowded workers in our great centres of industry. All this they have seen, and it has moved them to put pen to paper in the hope of doing something towards remedying it. The question at issue is very plain. Can the smoke evil be remedied? Is there any reason why we should continue to live in an atmosphere thick and black enough to resemble "acres of crape," as Charles Reade long ago put it? To this last question I give an answer in the negative. The evil can and might be cured. In making this statement I base it upon a lengthy and practical acquaintance with the subject—an acquaintance of a twofold character. In the first place, I had prior to 1890 a long experience of almost all kinds of boilers and furnaces; and, in the second place, I have since 1890 been Smoke Inspector for the City of Sheffield, a place which has above all others suffered from the ravages of the "smoke fiend," and which is known the world over as the "city of smoke and steel." My duties as Smoke Inspector have brought me in daily contact with all kinds of working conditions, appliances, methods, means, and men whose object has been smoke abatement; so with such an exceptional and practical experience I am entitled to give utterance to a few practical suggestions on smoke prevention. My aim in this pamphlet is to address, in a few short simple sentences, all persons who are interested in this question, but more especially do I speak as an engineer to engineers, engine tenters, boiler firemen, and furnace firemen. To these I would say that smoke prevention is entirely in their hands, in spite of any appliances, automatic or otherwise. I trust, therefore, that those who have such power placed in their hands (and at whose mercy manufacturers are) will give these pages that consideration which they deserve, and it will be my endeavour to make them a useful little handbook full of practical, sensible suggestions and rules for those in charge of boilers and furnaces; and I feel confident in saying that if put into practice they will make each man a public benefactor by stopping a nuisance, and making the condition under which the poorer people live healthier and happier.

SMOKE FROM BOILERS AND FURNACES.

As far back as 1819 smoke from boilers and furnaces was considered a nuisance and prejudicial to public health; and people began to inquire, experiment, and ascertain if it were practicable to prevent it. Commissions of inquiry were appointed, which laboured long, but with very little beneficent result. The question became a public one, and as years rolled on the interest in it increased, and resulted in Acts of Parliament, made with the idea to compel as far as practicable its prevention.

SHADES OF SMOKE.

There are many shades, colours, and densities of smoke. The Admiralty has prepared a "Smoke Form," which deals with the various kinds and colours of smoke, as emitted from the different kinds of manufacturing chimneys, viz., black, dense black, thin black, brown, dense brown, dark brown, light brown, bluish cast, and orange or yellow, dense and light; in fact, there are so many colours they are too numerous to mention. Some writers, lecturers, and speakers on smoke say that all smoke is a nuisance, and can be practically prevented. To such I would say, that their knowledge of the matter is not practical.

What does the Public Health Act of 1875 say on the subject? In Section 91, "Any chimney not being the chimney of a private dwelling-house, sending forth *black smoke* in such a quantity as to be a nuisance, shall be deemed a nuisance, and dealt summarily with, as provided by the Act." The same section also says, "That all furnaces and fire-places must be so constructed as to consume, as far as practicable, the combustibles used, without interfering with the said trade or process carried on therein."

So we have it here plainly laid down by law, that black smoke in such a quantity is a nuisance, and is punishable by penalty; and other smoke in the eyes of the law is not considered a nuisance. Black smoke, then, must be prevented from all kinds of furnaces as far as practicable, the onus of proving impracticability resting upon the defendants. It will be well for us to keep the law on this question in our minds, so that when we speak of practical smoke prevention in the following papers, we shall mean *black smoke*. We have black smoke in our midst; the Health Act says it is a nuisance, and persons creating the said nuisance can be punished by penalties, if they do not do all that is practicable to prevent it.

We are now called upon to consider the *causes of black smoke from boilers and furnaces*. The causes are many, and as varied as the conditions under which trade is carried on. But let us notice a few of them, and by examination find the cure, then the effect (black smoke) will quickly disappear.

Ignorance. — I do not desire to say a single hard thing against anyone who has such difficult duties to perform; what I shall say will be in all kindness, my aim being to throw a little light on the subject, and help rather than hinder in the way of smoke prevention. In this age, after so much agitation on the subject, writing in the Press, and talking on the platform, one is greatly amazed, when in contact with masters, managers, and men, to find in many cases their entire absence of knowledge on the common law of combustion. The explanation is simple from the masters' and managers' point of view; they are too busy in business matters to even give it a thought. The men who have charge of this work, and whose desire should be to obtain all information possible on the matter, never give it a thought. "Where ignorance is bliss," he thinks it a "folly to be wise,"

and from day to day he goes on in this condition of contentment, satisfied in a certain sense, that nothing more can be learned, that he is doing everything that can be done, until the Inspector points out how easily it can be prevented. Then he wakes out of his dream, and wonders why he didn't see how simple it was, under most conditions, to prevent it. Thus this lack of knowledge of a few simple rules which must be observed to ensure complete combustion is one of the greatest causes of black smoke. These rules we shall deal with later on.

Idleness.—Laziness is largely responsible for a lot of smoke. To prevent it means a little extra exertion on the part of the fireman, and this extra many will not use, unless continually watched; not like the other class, he knows what ought to be done, but hasn't that interest in his work to do it. He has a greater liking for sitting, reading, or rambling about, instead of giving that attention to the fires they require. How does he find time for the things named? By allowing too long a time between the firings, then putting three times more coal on the fires than he ought, and with what result?—(1) It takes a long time to burn through; (2) wastes the fuel; and (3) makes dense black smoke. This is not done through want of knowledge, but because of laziness; and there are far too many of this class of firemen, who are continually getting their masters into trouble by making preventible smoke.

Indifference.—Then there is another class of men whom we continually come in contact with in charge of boilers and furnaces, and whom we might call the indifferent. We cannot say this class is without knowledge — *re* smoke prevention — neither can we justly call them lazy, yet they seem to be unconscious, or unconcerned about their responsibilities. They are cautioned by the Inspector, and threatened dismissal by the master, but they go on in the same old style (after a few days), forgetting to watch the chimney when firing; never read paper or pamphlet on the question, never ask themselves why smoke is made, and how it might be prevented; they go on from day to day, and year to year, not caring anything at all about smoke prevention, but rather inclined to believe (as all firemen used to believe) that if they make black smoke, they are making a lot of steam. In my daily rounds I have met men with many years of experience, who have said "they cannot make steam without making black smoke." It is difficult to teach men of this class a little common sense in the way of firing. When they are shown how to generate steam quickly with less fuel and no dense black smoke they hardly will believe it, and drift into their old habits of indifference again. The only way to cure such indifference and foolish firing, is to make them pay the costs and penalty imposed for breaches of the Public Health Act. Do not think for one moment that I desire to put on the shoulders of the fireman all the blame for the emission of black smoke. He has, in many cases, the whole of the power in his own hands to prevent it; but in very many instances he is powerless to prevent, try as he will, because his

DRAUGHT IS DEFECTIVE.

What is the cause of defective draught? Small, cramped flues in a low chimney, and the boiler so built in that almost all air is entirely excluded from going through the boiler. With what result? Sufficient heat cannot be generated to cause combustion of the gases, the fires are sluggish, and black smoke is made. The fireman may do his level best to try and prevent it, but all to no purpose, because the draught is defective. These conditions are not uncommon, but far too common, and cause much black smoke, for which the master and not the man is responsible.

(To be continued.)

CONTROL OF PUBLIC WATER SUPPLIES.

It will be remembered that when, during the recent outbreak of enteric fever at Horsforth, it was alleged, as it was subsequently proved by a Local Government Board inquiry, that unfiltered water from a hillside, habitually manured with human excrement, was used to supplement the public supply, the directors of the company curtly refused to permit the inspection of their collecting grounds, or, in their own words, to "brook any outside interference with the management of their works;" and, indeed, the companies, including the Water Committees of Sanitary Authorities, acting in that capacity, display the same jealousy, the private companies refusing to recognise any right on the part of the Sanitary Authorities of the districts they supply to inquire into the modes of collection and of purification of the water that their constituents are compelled to drink, and the Authorities which themselves undertake this function, delegating the conduct of the works to the surveyor, the municipal engineer, or, perhaps, to one whose duties are exclusively those of a superintending and resident engineer, regarding the interference of the Medical Officer of Health as an unauthorised intrusion into a department with which he has no concern. We do not deny that a really competent engineer is fully capable of judging of the purity of the water as collected, and of the efficiency of the filtering processes, if he choose to study the subject; but it is equally certain that he cannot have the thorough apprehension of the relation between the water supply and water-borne disease, of the influence of impurities specific or indifferent on the public health, and of the means by which diseases, the bacteria of which exist out of the human body, are propagated and diffused, as one who with a medical training and a knowledge of the true significance of water analysis and a practical acquaintance with bacteriological research, has made a special study of the questions involved.

The Local Government Board intends, as we have reason to believe, to insert in all new water Bills promoted by private companies a clause empowering the Sanitary Officers of the districts interested to enter at all reasonable times for inspecting the methods of collection and of purification, but this will not meet the case of the more numerous existing companies. We are, therefore, pleased to learn that Dr. Porter, the energetic Medical Officer of Health for Stockport, to whose efforts this resolution on the part of the Central Authority is, we believe, due, has induced the Council of his borough to invite the Authorities of all districts at present dependent for their water

supply on private companies to join in memorialising the Government to pass a short Act empowering every Sanitary Authority supplied by a water company not being itself a Sanitary Authority, to depute any duly appointed officers, presumably the Medical Officer of Health and Engineer, "to enter, inspect, inquire, and take samples at any part of any source, or works of water supply, or water purification at any time by day or night," and requiring such company, "to afford all reasonable facilities and information for such inspection, inquiry, or sampling." Such a Bill need not extend beyond two or three clauses; it would not involve any financial question or introduce any conflict of Authorities or jurisdiction, or other contentious matter; and the only opposition it could provoke would be from the representatives of water companies interested in the concealment of actual or possible abuses. The memorialists very properly point to the fact that the consumers of flesh, milk, and other articles of food are more or less protected by legislation, and that such safeguarding is even more urgently required in the case of water—a necessary of life—of which the companies enjoy the monopoly, while the consumers are entirely at their mercy.

THE ISOLATION OF INFECTIOUS DISEASES.

By Dr. J. H. GARRETT, M.O.H., Cheltenham.

THE one disease above all others which contributes most cases to the filling of isolation hospitals is scarlet fever. In fact, in many towns and places no provision is made for the isolation of any infectious diseases besides scarlet fever and small-pox, and as the latter disease is now only an occasional visitor, the isolation of infectious diseases resolves itself in those places into the isolation of scarlet fever almost simply.

That the segregation of infectious persons should be limited in this manner to one or two diseases is not in accordance with the ideals of the sanitarian, but one may conceive that in many districts at least, the difficulties attending the discovery and removal of cases, as well as the great expense involved in retaining them in hospital till free of infection, are sufficient to bar the possibility of isolating more than a moiety of the infectious cases that occur. Thus the isolation of enteric fever and diphtheria has not been attempted in many districts otherwise than in an irregular or casual way, although the advantages of an early segregation of such dangerous infectious disorders is too patent for argument.

So far as I am aware, no attempt at all has been anywhere made to systematically isolate measles and whooping-cough, which are diseases that annually claim many thousands of victims, chiefly children of tender age. The great numbers of cases which in epidemic periods are liable to occur preclude the possibility of adequate hospital accommodation being provided in the case of the two last mentioned diseases, although I may say in passing, that in my opinion the notification of them would tend largely to diminish the death-rate amongst such cases, and in some degree to limit their numbers.

In a population of some fifty and odd thousand lying together on a fairly distinct and circumscribed area, the opportunities of an effective isolation should be greater than in a larger or more scattered district, and the feasibility of such a contention is well illustrated by the fact of our having isolated in hospital 93 per cent. of the scarlet fever cases which occurred in the borough last year, the complaint being at times rather prevalent in one locality or another. I should like to be able to say as much for the diphtheria and enteric fever cases, and in regard to the former there is no reason why so much might not be said; but although special provision has now been made here for the isolation of both these diseases, I apprehend from one cause and another that we shall not, at least for some time to come, be able to remove to hospital so large a percentage of the enteric fever cases, one of the main reasons being the habit that medical practitioners have acquired of treating such patients in their own homes, and their reluctance to allow them to be sent away.

That enteric fever patients may be treated at home and no second case in the house or in any of the neighbouring houses occur is quite true, but the experience one has had of another case, or other cases, cropping up in the near vicinity of a first case, leads one to the opinion that it would be to the public advantage if most enteric fever cases were treated in hospital, where a routine system of disinfection of stools, &c., could be much more certainly carried out than is ever done in private houses, not to mention other advantages of hospital treatment.

Of course, for any hospital it is desirable that there should be a resident Medical Officer, but in the absence of such a provision patients are still infinitely better off in regard to their care and medical treatment than they would be in their own homes. In our own case the Medical Officer to the hospital lives on the same side of the town as that in which the hospital is situated, and is in communication with the hospital by telephone. Acting under general instructions of the Managing Committee of the hospital, he is able at any time to call in such medical assistance as he may require in any operation or for other purposes. Sister Isabel, the matron, was formerly a nursing sister in the hospital, and she has under her an efficient staff of nurses.

It is quite possible that the question of *cui bono* may arise in the minds of some of our guardians of the public purse when contemplating the removal of so many mild cases of scarlet fever to hospital, and the continuance of the disease in the town notwithstanding. But although one cannot hope that the notification and isolation of such a disease as scarlet fever, the cause of which is obscure in its nature and origin, will lead to its extinction, yet I think we have ample evidence to show that the number of cases occurring is limited, and what would have been a serious outbreak but for these measures, is often toned down into a very minor affair.

A teasing question connected with the isolation of infectious cases is the recovery of fees from the patients for maintenance in the hospital. Such recovery of fees is permissively authorised by the Public Health Act, 1875, but in the case of the very poor, the attempt to recover would not only be a hardship upon the patient or those responsible for him, but would be sure to lead to an objection on the part of the friends of the sufferer to the removal,

and under such circumstances it would not be possible to get half the cases into hospital. This practical difficulty has had to be met by an assurance, which has now come to be an understood thing, that poor people will not be called upon to pay anything for the maintenance and treatment of their cases.

I am strongly of opinion that no charge should be made for any case that is sent into hospital by the Medical Officer of Health on public grounds, and should suppose that if a person were sued in a Court for the recovery of these charges, and stated that it was neither his will nor desire that his child was sent into hospital, but that he yielded to the pressure of the Medical Officer, and permitted his child to go purely for the public benefit, as represented to him by the public officer, it would be doubtful justice if he were ordered to pay. Those who can afford it will naturally have their cases treated in the private wards, and for these, of course, payment must be made, but that is quite another matter.

A YEAR'S PROGRESS IN SANITARY SCIENCE.*

By Joseph Priestley, B.A., M.D., D.P.H., &c.

SEWAGE PURIFICATION.

The year 1897 will ever be memorable on account of the prominence given during it to the subject of the bacteriological purification of sewage. The personal experience of such an authority as Mr. W. J. Dibdin, late chemist to the London County Council, has been published to the world in a book on the "Purification of Sewage and Water"—a work dealing only with principles, but not the less valuable. The principle is established that organic matter is destroyed by microbes, which rapidly increase under favourable circumstances, *e.g.*, the presence of fresh air (or oxygen) to prevent putrefaction, and a suitable pabulum upon which the microbes can feed. Complex organic matters containing chondrin, gelatine, albumen, starch, &c., are broken up by these microbes, and simpler combinations of elementary bodies result, *e.g.*, the C becomes CO_2; the H, H_2O; and the N, N_2O_3 or N_2O_5 (nitrous or nitric acid). Nature's method of purification is simplicity itself, and brought about by small bodies (varying from $\frac{1}{5000}$ to $\frac{1}{25000}$in. in diameter), which are really plants, depending for their efficacy upon their life and activity.

The sewage to be purified is in the first place strained or screened, and then passed on to filters of coke breeze, crushed clinker, ballast, sand, gravel, &c., the value of the filters being twofold, viz., (1) as mechanical separators; (2), as oxidisers of organic matters, whether in suspension or solution, by means of living organisms. The presence of air is so important that these filters have perforated walls, so that the whole substance of such filters can be aërated in all directions and at all depths, and must be used so as to admit of definite periods of rest. Thus, each filter bed may be so arranged (as mentioned by Mr. Dibdin) as to take one hour to fill, two hours to rest full (whilst the microbes do their work), one hour to empty, and three hours to remain empty (so as to ensure thorough aëration), whilst its surface must be raked over daily. The index of efficiency of a filter is to be found in the amount of nitrites or nitrates to be discovered in the effluent—the more nitrites or nitrates the better filtration, and *vice versâ*. Indeed, this chemical examination of the *average* daily sewage and effluent is a *sine quâ non*, and shows the quantities of oxidisable organic matters, the nitrites and nitrates in the effluent, and the amount of matters held in suspension—such details being most useful in enabling a correct judgment to be formed as to the efficiency or otherwise of the purification process. Further, the quantity and nature of the suspended matters is obtained by collecting on a microbe-filter and examining; whilst the filter beds may be graduated from coarse grains, through fine grains, to sand, and the effluent (after passing through these) be passed over land. Such is the Barking and Sutton system of Mr. Dibdin.

The Exeter system (tried also at Yeovil), carried out by Mr. Donald Cameron, the Borough Surveyor, is on the same principle, viz., the biological purification of sewage, and is effected in closed tanks, wherein putrefaction plays a prominent part, and from which the effluent is passed over coke breeze filters, and then finally (if required) over land. During the past year an inquiry has been held by the Local Government Board at Exeter, and the result of such inquiry will be awaited with eagerness by all Sanitary Authorities interested in sewage purification, as the simplicity, financially and otherwise, of the biological system being admitted, all that now remains to show is whether or not it will work out as satisfactorily in practice on the large scale, as it has theoretically in the laboratory and practically on a small scale.

Cameron's method (Exeter and Yeovil) depends—at least at first—upon the action of anaërobic microbes, acting in the dark and in the absence of air in the so-called septic tanks; whereas Dibdin's method (Sutton and Barking) depends for its efficiency upon the aërobic microbes, acting only in the presence of fresh air and light (*i.e.*, oxygen). Cameron's method in the tanks becomes Dibdin's method in the filter—the former a reducing or deoxidising action, the latter a purely oxidising one, with the conversion of ammonia into nitrites, and finally into nitrates (the nitrous and nitric acids uniting with the bases present respectively). The filtering process in both requires a plentiful supply of oxygen, and to obtain this the filtration must be intermittent—a condition of things brought about, in Dibdin's method, by hand labour; but in Cameron's, automatically by a patented simple alternating gear.

It is clear, therefore, that, where this principle of sewage purification by bacteria is relied upon, the addition of antiseptics to the sewage is worse than useless—at least in so far as lime, carbolic acid, &c., are concerned, though Mr. Dibdin is of opinion that permanganic acid, which is simply an oxygen-carrier, and acts by destroying organic matter without killing the microbes mentioned above, may with advantage be added. Ordinary disinfectants simply exert an inhibitory action over the microbes, which are the useful little scavengers of sewage disposal, and require, if anything, rather to be helped by means of oxygen, fresh air, light or other-

* Abstract of article contributed to the *Medical Annual*, 1898.

wise, further details of which will be forthcoming as experience increases and the practical working of this bacterial system of sewage disposal is more studied. These useful and beneficent microbes must, of course, be distinguished from those that cause disease, and against which it is the duty of sanitarians to fight vigorously and incessantly; indeed, there is setting in a reaction amongst scientific workers on the question of germs or microbes, and the microbomania of a few years ago is disappearing, or at least undergoing modification.

The future of the bacterial sewage purification is assured, and sanitarians and others will look forward with anxiety and impatience to reports and further information on the subject—the year 1897 having simply seen the principle well established.

PUBLIC ELEMENTARY SCHOOLS AND THE SPREAD OF DISEASE.

The Local Government Board (Medical Department) have issued an important memorandum during the past year on the circumstances under which the closing of public elementary schools, or the exclusion therefrom of particular children, may be required, in order to prevent the spread of disease without causing any unnecessary interruption of the work of education. The Board points out that the closing of schools is a measure to be seldom enforced, except under circumstances involving imminent risk of an epidemic, nor even then as a matter of routine, unless there be a clear prospect of preventing the propagation of disease, such as could not be looked for from less comprehensive action. Article 88 of the Code of Regulations approved by the Lords of the Committee of Council on Education renders it compulsory upon managers to *at once* comply with any notice of the Sanitary Authority (or of any two members) acting on the advice of their Medical Officer of Health, either to close the school or to exclude certain children from attendance, with a view to preventing the spread of disease, or any danger to health likely to arise from the condition of the school, *e.g.*, insanitary or otherwise, with right of appeal to the Department, after complying therewith. This procedure is to be put in force chiefly for diseases that spread by infection *directly* from person to person, *e.g.*, measles, scarlet fever, diphtheria, whooping-cough, epidemic influenza, small-pox, rötheln, but also for enteric fever or diarrhœa, if necessary.

The importance of children from infected houses being excluded so as to prevent them attending school in a latent form, or in an unrecognised stage of the disease, or to prevent infection by clothes, needs only to be mentioned to be acknowledged; and as a rough working rule it may be stated that schools ought to be closed where there are many undiscovered or unrecognised cases, or when the known centres of infection are very numerous, and where too much intercommunication elsewhere than at school does not take place, more especially where exclusion of separate children is not successful owing to mild and unrecognised cases. Closure, it is to be remembered, is an extreme measure, however.

As some diseases are not notifiable to the Sanitary Authorities, it is important that the school attendance officers, and school masters and mistresses, should notify cases amongst scholars of infectious diseases and others, *i.e.*, the notification of absentees, and should look out for symptoms in epidemic times (*e.g.*, heat of skin, shivering, headache, languor, vomiting, rashes, sore throats, &c.), so that precautions may accordingly be taken in the way of excluding children from school, &c. The Medical Officer of Health is clearly the proper person to advise as to the precautions to be taken, length of time during which children are to be excluded from school, or schools closed, &c., and the Local Government Board have laid down that where schools are closed, the Medical Officer's reports to his Authority, stating grounds and reasons for closure, shall be regarded as special reports, and consequently copies shall be sent to them and to the County Council of the district within which the school is situated.

The above conditions apply only to public elementary schools, and not to Sunday or other private schools, these latter being dealt with under the Public Health Acts as contravened.

The issuing of this Memorandum is opportune at the present time, as the subject of the spreading of infectious diseases through the medium of schools is coming rapidly to the fore, and statistics are fast accumulating which show that such inter-relationship between infectious diseases and schools does exist. Such statistics may be necessary to convince the lay mind, but are hardly needed for Medical Officers, who, if of any experience in practical sanitary work, must have had many opportunities of proving for themselves the truth of such inter-relationship.

The examination of scholars individually and the exclusion from schools of those suffering from, or sickening for, an infectious disease, together with the other inmates of the same house, with a systematic notification (and subsequent medical examination) of *all* absentees to Health Officers are important steps towards the prevention of the spread of disease, and may prove all-sufficient in the case of some, though school, or class, closure is certainly indicated, and required, in the case of others, of the infectious and contagious disorders, and under the conditions as stated above.

(*To be continued.*)

SOIL CONDITIONS: THEIR PRACTICAL RELATIONS TO INFECTIOUS DISEASES.

Dr. W. H. Welch, in a recent issue of the Baltimore *Health Magazine*, discusses the fate of pathogenic organisms which find their way into the soil. Although the nature of the relationship between the conditions of the ground and the prevalence of tuberculosis is not well understood, practical experience has shown that many localities have secured, by good drainage of the soil, great reduction in the mortality from this most deadly scourge of the human race—a reduction amounting in some places to nearly 50 per cent. of the former death-rate. Similar measures in Berlin and elsewhere have notably lowered the mortality among infants, particularly from summer diarrhœa. Having once reached the soil, disease-producing germs may be conveyed to us in manifold ways. An important medium of transportation of bacteria from an infected soil is the water which we drink or use for domestic purposes. Among the various other ways by which harmful bacteria may reach us

from contaminated ground it will suffice to specify their conveyance attached to particles of dust in the air, their transportation by flies and other insects, and by domestic animals, their presence upon vegetables, especially those eaten uncooked, and our own direct contact with the soil.

It is evident that the possibilities of infection from soil contaminated with disease germs are numerous and often intricate. The list of diseases whose causation has been shown to stand under certain conditions in more or less direct relation to contamination of the ground with their specific germs is a long one. Among the more important may be mentioned malaria, typhoid fever, cholera, yellow fever, dysentery, tuberculosis, and the summer diarrhœas of infants. Experience teaches, unmistakeably, that contamination of the soil with organic refuse favours the development and spread of such diseases as these, and that the drainage and purification of the soil by proper systems of sewerage are among the most effective measures for their prevention.

No more instructive illustration of the value of modern methods of public sanitation can be found than the inability of Asiatic cholera to secure a foothold during the last two European epidemics in clean cities, with proper sewerage and water supply, and its ravages in notoriously filthy or insanitary cities, such as Toulon, Marseilles, Naples, and formerly Hamburg. Authorities have differed as to the relative value of sewerage and of water supply in influencing the prevalence of typhoid fever. We need not pause here to discuss this matter. Both factors are important, the drinking water usually the more important. But it is sufficient for our purpose to show that purification of the ground by proper disposal of sewage is one of the factors in determining a reduction in the occurrence of typhoid fever and other diseases.

It is by no means an easy matter in all cases to assign to each one of the various recognised elements which go to make up an entire system of satisfactory municipal sanitation its due share in the beneficial result, for it rarely happens that one is introduced by itself alone, and the harmonious working of the whole system is often necessary to secure the best results from the individual factors such as pure water supply, efficient sewerage, good drainage, cleanliness of streets, improvement or removal of insanitary quarters, thorough sanitary inspection of dairies and food stuffs, public disinfecting establishments, hospital for infectious diseases, municipal laboratories, &c. In some instances, however, the conditions have been such as to furnish conclusive demonstration of the separate influence of the introduction of effective sewerage upon the death-rate from typhoid fever.

TO OUR READERS.

The Editor solicits the co-operation of readers in making THE SANITARY RECORD *more attractive by means of pen-and-ink sketches, photographs, and diagrams. There are many phases of sanitary work which lend themselves admirably to illustration. By this means not only individual articles, but the journal as a whole will be heightened.*

TYPHOID FEVER: IS LONDON SECURE AGAINST OUTBREAK?

By Dr. HENRY KENWOOD, M.O.H., St. Mary's, Stoke Newington.

THE problems connected with the life-history of the bacillus of typhoid fever outside the human body are now being scientifically attacked, and recent work by Lösener, Martin, Pfeiffer, Kolle, Robinson, and others, tends to establish the view which is supported by so much circumstantial evidence, that polluted soil is the great medium in which the germ thrives; and the fact that the death-rate from typhoid fever in this and some other countries has been markedly reduced during recent years may safely be attributed, in the main, to two circumstances, *i.e.*, firstly, that the pollution of soil has generally been diminished; and secondly, that the increased precautions taken of late years to guard our drinking water and milk from pollution have had the effect of materially reducing the extent, by spread, of a filth disease which is so frequently water or milk-borne.

To reduce typhoid incidence every effort must be made by the proper sanitary control of encampments of itinerants, &c., and by the abolition of leaky and defective drains, cesspools, midden-pits, &c., to guard the soil—more especially that around houses and in the neighbourhoods of collecting areas for drinking water—from an infection which may doubtless grow and remain active in such soil for long periods under certain favourable conditions; and the possibility of water acting as a carrier must be removed in the only certain way, *i.e.*, by going to a pure source for a pure supply, and sparing no pains and expense to guarantee the continued purity of the water from the site of its collection until it reaches the consumer.

The principle of attempting to purify a polluted water is wrong if it can possibly be avoided, and, having regard to the tremendous issues at stake, indefensible. Purification through sand, for instance, is at best imperfect and by consequence dangerous, for our methods of detecting the infectious power of water, where typhoid is concerned, are still very unreliable; chemical and bacteriological examination may both fail, and even if the latter succeeds, the information can rarely be furnished under a week; and think of the mischief which may, and does, result in the meanwhile. Our only real safety lies in selecting a pure water supply, and in keeping it pure. Typhoid fever can only become markedly epidemic in this country when the infection gains access to a widely-distributed carrier, such as water and milk, and this circumstance sufficiently indicates the main lines of our defence against the disease. The recent outbreak at Maidstone has set every Authority a question to answer—What security have they that the means adopted to protect their district from such an outbreak are sufficient? In London every thinking individual must have his misgivings. The purity of a water supply must always be measured from the standpoint of the worst sample distributed; and, especially in time of flood, the drainage areas of the Thames and Lea furnish considerable pollution to the river waters, and a sand filter is asked to protect London from the almost constant danger of water-borne disease. Certainly the death-rate from typhoid fever is low for London, but as

Professor Corfield and Mr. Shirley Murphy have shown, there is an exceptional incidence of the disease in those parts of London supplied by Thames water during flood time, and the chemist to the London County Council and the bacteriologist to the Local Government Board have demonstrated that, at these times, living animalculæ, considerably larger than the typhoid germ, may pass through the filters into the filtered water.

In non-epidemic periods a considerable number of isolated cases crop up in every community, the cause of which can only be conjectured by the Medical Officer of Health, and in which it is very exceptional to be able to trace the infection to a preceding case; but when the infection is traced to a preceding case we are no nearer the scientific truth of the real origin of the infection itself. How did the preceding case contract it? There is undoubtedly a great difficulty in arriving at the probable cause of these sporadic cases, and this is largely due to a fact, *i.e.*, that in the majority of cases one learns, on inquiry, that the patient was ill or ailing for several weeks before the condition was diagnosed, and in consequence it is impossible to determine the actual period of infection with any degree of precision, and therefore to hit upon its most probable cause. The origin of these isolated cases is very generally a matter of pure conjecture; the tendency is all too common to ascribe the cause to any marked insanitary condition of drainage and water supply noticed when the house is inspected. That such are concerned in the appearance of the disease is, to my mind, unquestionable; but since almost every house in this parish, when house-to-house inspected, was found to present one or more such insanitary conditions, and the sickness from typhoid fever gives no indication of a material reduction as these conditions are removed, it cannot be held that when in one of such houses a case of typhoid fever occurs, the condition is certainly due to the insanitary conditions which may be found. We must not rest content with those sham investigations which are satisfied with the mere discovery of a preceding case, and which conclude, haphazardly, that one of those insanitary defects which exist in so many houses is necessarily the cause of the infection, though drain and sewer gases certainly contain poisonous substances, either of the nature of gases or vapours, which strongly predispose those subjected to them to disease in many forms—among which one may safely include typhoid fever and diphtheria.

A SPECIAL meeting of the Bangor Town Council was held recently to consider a letter from the Local Government Board, refusing to entertain an application of the Council for sanction to a loan of £450 for the purchase of land adjoining the gasworks until a definite scheme for the utilisation of the land was submitted. It was resolved to direct the Town Clerk to ask the Board to reconsider the matter in view of the straitened circumstances the Council was in with regard to the gasworks, and also to ask for permission to open a suspense account, so as to complete the purchase of the land, pending the Council being in a position to present the definite scheme asked for.

THE SANITARY INSTITUTE.

SUPERVISION OF WATERSHED AREAS.

A SESSIONAL meeting of the members of the Sanitary Institute was held on Wednesday, 6th April, at the Parkes Museum, Margaret-street. Professor G. J. Symons, F.R.S., presided, and there was a good attendance.

Mr. R. E. Middleton, M. Inst. C.E., read a paper on "The Desirability of Making Watershed Areas and Sanitary Districts Coterminous." He quoted the opinion of Major Flower, expressed at the Leeds Congress, in favour of the division of the country into watershed areas for purposes of water supply and drainage, which areas should be made coterminous with the sanitary districts. Streams and rivers, he said, from the earliest times had been put to different and antagonistic uses. They had been considered to form the natural source of supply of water for drinking and culinary and ablutionary purposes, and at the same time to be receptacles for all animal, vegetable, and mineral refuse. It had even been maintained in quite recent years that the latter is the

NATURAL AND PRIMARY DUTY

of every stream or river. But the first use of a river, from the sanitarian's point of view, was to provide water for animal life; and, secondly, it might provide power for milling or manufacturing purposes; thirdly, it might be used for carrying persons and property; lastly, and not until the other requirements had been satisfied, it might be used in such a manner as not to defeat its primary obligations, for the removal of refuse matter. In every direction, however, the tendency to pollute streams and rivers, was, from a variety of causes, on the increase, at the same time that a demand for a supply of pure water was likewise increasing, while the area from which a supply might be safely drawn was diminishing. Many rivers had become impossible as sources of water supply on account of the trade refuse passed into them. Undoubtedly, the pollution most dangerous to man was that produced by man himself. The untreated excreta of the human being were at all times a source of danger, but when they proceed from a diseased human being they may carry with them the germs of death to many fellow-creatures, and with the increase of population came increasing difficulty and increasing costliness in dealing with the refuse—animal, vegetable, and mineral—which results from human aggregation. It seemed doubtful if any danger was to be feared from the droppings of cattle when living in the open, and even if they were to some extent dangerous, they were necessarily limited in quantity, for cattle cannot live in an area which will not easily disinfect all the manure they produce.

ARTIFICIAL MANURES,

such as guano and fish in a putrid condition, were much more to be feared than any natural manure. The available water supply was also becoming more limited on account of the amount of land which is occupied by towns, villages, and manufacturing centres, while the increase of population, the demands of a higher civilisation, and the greater requirements for steam and similar uses, all call

for a greater supply, and a more liberal use of water. Consequent on the increase in the size of our large towns, the demand for water had led to an upsetting of all preconceived ideas as to the sources from which supplies should be obtained. Manchester obtained a supply, not from its own district, but from Cumberland, Liverpool from Vyrnwy, Birmingham from the Elan Valley, and the London County Council would have us look to the valleys of the Usk and Wye for the metropolitan water supply. There did not appear to be any efficient conservation of the sources of supply for the use of those who were the natural heirs to it, viz., those who are the first to receive it from the atmosphere, and at whose feet it is running, either above ground in the form of streams and rivers, or below ground in tiny rills. Every town and village situated on the banks of a river or one of its tributaries had a vested interest in the maintenance of the purity of the water which flows towards it, and at the same time the town or village desires to discharge its refuse into the stream, making it a nuisance to its neighbour lower down. The protection afforded to consumers by

NATURAL PROCESSES OF OXIDATION

and the action of vegetation and sedimentation were not sufficient unless they were supplemented by the power of an authority strong enough to curb the tendency of the human animal to get rid of the refuse he creates with the smallest amount of trouble and at a minimum of cost. The disposal of sewage was until quite recently a subject not to be mentioned to ears polite; suddenly sanitary science became a fashion, and much was done in a hurry which would have been done better if it had been longer thought over. Sewage disposal works in many places were practically useless, because the inhabitants had not the money with which to keep the works in order. In other cases sewage disposal works were conspicuous by their absence. The selfish policy of turning all refuse into the nearest stream led to still greater pollution of the water supply as population and manufactures increased; the natural course of procedure which puts the provision of a pure and sufficient supply of water first and the disposal of sewage second was reversed, and the position became intolerable. Moreover, the earlier efforts of legislation were directed to the provision of sewage disposal, while omitting to require that this necessary stipulation should be preceded by

AN AMPLE SUPPLY OF WATER.

Subsequent legislation had inclined to leave the cart before the horse, and to subordinate any question of water supply to that of sewage disposal, making the latter compulsory and the former to a large extent permissive. The Rivers Pollution Act of 1876 was consequently very tender to vested interests, and entirely insufficient to curtail the increasing tendency to pollute. Considering the constitution of the Authorities which have to administer the Acts dealing with the provision of water supplies, with the disposal of refuse, and the pollution of rivers, it was scarcely to be expected that the result should be other than it is. All authorities had conflicting interests to consider, and it was easier to go outside their areas for a water supply than face the difficulties of dealing with the sewage which they must get rid of. In this manner enormous drainage areas were becoming useless for purposes of a water supply, and large towns had to tap distant sources at present unused and uncontaminated sources of supply. It seemed reasonable that each district should supply its own needs, both in respect to water supply and sewage disposal, but this could not be done unless a pure water supply was put first and sewage disposal subordinated to it by rigorously enforcing the obligations consequent on the aggregation of large bodies of men in centres of industry. If areas of water supply are to be efficiently safeguarded, if rivers are to be preserved from pollution, the present system of

DIVIDED AUTHORITY SHOULD BE ABANDONED,

and a general policy substituted. Having referred to cases in which districts had amalgamated for common purposes, Mr. Middleton gave some figures to show how many different Authorities were affected by the watershed areas of the Thames, Severn, and Ouse, in order that some idea might be formed of the conflicting interests existing in watershed areas under the present division of administrative districts. A further consideration, he said, which pointed to the necessity for having some Authority responsible for watershed areas, was that of floods. Many districts in England were periodically flooded, with disastrous results. The Rivers Pollution Act did not provide powers of sufficient stringency to enable the pollution of rivers to be dealt with efficiently, and certain Acts of Parliament, such as the Mersey and Irwell Acts of 1892, and the Thames Conservancy Act of 1894, had been passed extending the powers of existing Authorities. These Acts were, however, purely local, and it was desirable that their powers should be made general, and that an Authority similar to the Thames Conservancy Board, but with extended powers for raising funds, should have charge of the principal rivers of the country. In what manner the watershed areas should be mapped out, whether the existing boundaries of counties, sanitary unions and parishes should be adhered to, or whether there should be a re-arrangement of these artificial divisions, was too large a subject to be dealt with in that paper. The constitution of the proposed Authority was also a matter of great complexity, especially as regards the

QUESTION OF RAISING FUNDS,

but he thought it should be representative of every class and interest, and that its duties should consist in the conservation of the river, its banks and navigation, if any, in the maintenance of its purity, including that of its tributaries, in the encouragement of combination and efficiency in sewage disposal, and in the prevention of floods. (Applause.)

On the suggestion of the CHAIRMAN a hearty vote of thanks was accorded to Mr. Middleton for his paper, and Major Lamorock FLOWER, Mr. Baldwin LATHAM, Dr. A. HAVILAND, and others joining in the ensuing discussion, expressions of concurrence in the lecturer's opinions being general.

Mr. MIDDLETON, having replied to some of the points raised, a hearty vote of thanks to the Chairman, passed on the proposition of Mr. H. P. BOULNOIS, closed the meeting.

At an examination in Practical Sanitary Science, held in Birmingham on April 1st and 2nd, 1898,

our candidates presented themselves. The following two candidates were granted certificates in Practical Sanitary Science :—Walter Harry Woods, Richard Philip Fleming.

At an examination for Inspectors of Nuisances, held in Birmingham on April 1st and 2nd, 1898, thirty candidates presented themselves. The following ten candidates were certified, as regards their sanitary knowledge, competent to discharge the duties of Inspectors of Nuisances :—Bertram George Bannington, William Barnes, Guelph John Bird, Francis Charles Braley, Alan Bromly, Charles William Cooper, Thomas Gough, Thomas Hudson, Frederick Merrifield, Jonathan Nichol.

THE THEORY OF SANITATION.

In the course of a lecture, entitled as above, recently delivered at Boxmoor, Herts, Dr. Maitland Thompson said that the subject—"The Theory of Sanitation"—was too wide to be dealt with *en bloc*. What he proposed to touch upon principally was the modern treatment of sewage. His apology for introducing such a morbid subject must be in the first place—whether he mentioned the subject of sewage disposal or not—that for the next two years they would be constantly reminded that some great change was taking place in that district for the disposal of the sewage. The roads would be obstructed, and those of them who were ratepayers would be still further reminded, and in his opinion they would be put to a much greater expense than was necessary. He was well aware that the disposal of the sewage had puzzled Sanitary Authorities, more or less, since the Public Health Act come into force. A district like theirs presented peculiar difficulties, part of it being very low-lying and water-logged, and most of the land around being unfit for the reception of sewage. They were most of them probably aware that the Hemel Hempstead District Council had adopted a scheme for pumping the sewage of that district on to a tract of land, and at a level somewhat above the tops of the houses. That scheme was adopted as the result of the repeated threats from the Thames Conservancy, and of the pressure from the Local Government Board. The health of the district, however, did not demand the change. The percentage of zymotic or infectious diseases was by no means high as compared with thoroughly sewered districts, even at the present time. He did not wish them to assume for one moment that he disparaged a thorough system of drainage. On the contrary, he would advocate more thorough, more modern, and much less expensive methods than had been adopted in Hemel Hempstead. He described the conditions under which the sewage, by land filtration, could be fairly successful; but, he said, the site chosen there for the sewage farm was, on the evidence of all the experts who had examined it, unsuitable. Most of the land consisted of a few inches of soil spread over chalk. Chalk would, under certain conditions, swallow up endless quantities of moisture; but sewage matter introduced into chalk had been known to appear again miles away and pollute wells and water supplies. It was quite possible that the gathering ground of the Hemel Hempstead water supply was part and parcel of that land. There they were introducing a danger which did not at present exist, and in the near future they might have an outbreak of typhoid —or some similar malady—due to polluted water, of which Maidstone had recently afforded such a glaring object lesson. It had been recently proved that the germs of certain diseases, such as that of typhoid fever, would remain active and multiply in the soil in the English climate for a year or more. These found their way into water supplies. In dry weather these germs might be distributed broadcast in the particles of dust that were driven by the wind, so that after incurring the constant expense of pumping, and the accidents and incidents attaching thereto, the sewage matter had still to be reckoned with. That the authorities in Hemel Hempstead should have been so suddenly rushed into a scheme such as they had adopted, without scientific investigation of other treatments and methods, had been a great surprise to many. Other Sanitary Authorities with an infinitely greater rateable value than theirs had had the sense and courage to say at once that that system was too expensive for them, even if it was the best that could be devised. The District Council of Hampton, for instance, more sorely pressed by the Thames Conservancy than they in Hemel Hempstead were, and situated as they were on the Thames, had adopted a bacterial treatment of sewage in tanks. When he ventured some twelve months ago to suggest a similar treatment (the outlines of which were most ably traced out and explained by one of the greatest authorities of the day on the subject) to the District Council, he received but scant attention. The Council sat, watch in hand, and gave them ten minutes in which to explain—as though they were seeking paltry outrelief. They sought a vast relief—not only a personal one; but they sought to relieve the rates of some thousands of pounds, and they all knew what that meant in a poor district like theirs. He personally on that occasion advised the Board to do what the city of Exeter did in November last—apply to the Local Government Board for borrowing powers on a bacterial system, with a minimum amount of land to meet the requirements of that Authority. They had enough land at Frogmore End for the purpose. He trusted that it was not too late, even at the present time, for the Board to adopt a tank treatment and save them the constant expense of pumping, and the dangers he had indicated. The land at Bennett's End could be sold, and if it was a loss it would be better than being saddled with a constant sinking fund. He referred to the fact that a Royal Commission was to be appointed to investigate the subject of the bacterial treatment of sewage. The bacterial treatment was capable of popular explanation, and this would perhaps suffice, as it would be impossible for him to explain it in detail in the short time available. The destruction of organic refuse was naturally brought about by the agency of micro-organisms or bacteria, which were nature's scavengers. What nature did very slowly (as when sewage was cast upon the land) and imperfectly could be done more quickly and completely, with less danger and offensiveness, and at less cost by filters and tanks. It was not in the ordinary sense a chemical process. It did not consist, as some were disposed to think, in disinfecting or destroying organic refuse by means of chemicals. That process had been tried in the past and was a failure, simply because it was

contrary to nature; and it had delayed the introduction and adoption of the natural process until recent years. Dr. Thompson quoted the opinion of Mr. Dibdin (late chemist to the London County Council), who was strongly in favour of the bacterial system, and gave instances of its success. The bacterial treatment had succeeded when the sewage was distinctly a trade sewage; by that he meant sewage issuing from chemical, dye, and other works—the most difficult to deal with. In their district the sewage might fairly be described as a domestic one, and therefore the easiest of all to handle. He mentioned several towns in which the bacterial system was in operation, and in every instance acting to the satisfaction of the inhabitants generally. The lecturer referred to the conditions of life in days gone by, when the earth closets were used, and the sewage matter was left to nature's scavengers. Very soon the old-fashioned cess-pits would re-appear in the form of larger sized modern tanks and filters, according to the populations to be dealt with. Nature would then continue to do its work under the supervision of scientists. After having referred to bacteriology as a study, Dr. Thompson said that bacteria played an active part in the causation of nearly every disease, and a new system was being opened up in the treatment of disease as a result. As surely as the microbes that acted on the living tissue caused disease, destruction, and death, would those that attacked dead tissue entirely destroy it and render it harmless, effecting a great economy in nature.

A NEW TYPHOID PAN.

THOSE who have to battle with that most insidious of all diseases—typhoid—will appreciate the importance of completely isolating the excreta and other matter proceeding from the patient from any but the slightest contact with the outer air. Such desirable results may now be effected by the use of Hancock's patent typhoid pan, manufactured solely by the Winton Pottery Company, Elgin Works, Stoke-on-Trent. The pan under notice, which is being rapidly adopted throughout the country, is very portable in size, is cylindrical in form, with a holding capacity of about a gallon; it is made of stout cream-white earthenware of such a thickness that breakage is well nigh impossible; it has a lip to facilitate emptying, and has two wide grooves within the pan—the lower one to receive the cover, and the upper one has three indentations for the manipulation of the interlocking device. The cover, which is the principal part of the patent, is fitted with a broad band of vulcanised rubber, adhering by elasticity to a verge adapted for the purpose, the rubber being rendered thoroughly antiseptic by a special chemical treatment. The interlocking arrangement, by which the pan is rendered "gas tight," consists of a tripod, operated upon by a milled circular screw, securely cemented in an aperture penetrating only half through the cover, thus involving not the least contact with the outside air; by the merest turn of the wrist, pressure is brought to bear on the cover, and the pan becomes hermetically sealed. There is not the least risk of leakage or unpleasant effluvia from the contents, no matter in whatever position it may be handled, or the length of time that elapsed before the contents are taken away for incineration purposes. The Local Authorities in the towns surrounding the place of manufacture have grasped the value of this typhoid pan, and it is now universally adopted by them, not only within the municipalities, but in the more remote suburban districts. A specimen of the pan has been submitted to us for inspection, and we unhesitatingly pronounce it an appliance of great value from a sanitary standpoint.

Annotations from Annual Reports.

Are Model Dwellings Unsanitary?—This question is answered in the affirmative by Dr. Joseph Soane, Medical Officer of Health, Whitechapel, who, alluding to examples in his own district, states:—"That the direct influence of these barrack dwellings upon the health of their occupants—more especially of the children—is adverse, I have not the slightest doubt. I have reason, moreover, to believe that the spread of zymotic diseases is aided by the general plan of construction adopted in dwellings of this class. A staircase leading to a corridor, which affords access to many rooms more easily facilitates the spread of disease than in the case of tenements which are more separated. It may also be said that as the staircases and passages frequently have to constitute the playground of the children, another factor is imported to account for the spread of disease. I have collected evidence which supports my opinion that both scarlet fever and diphtheria evince a marked tendency to appear in families who occupy rooms which are adjacent to other rooms where the disease has already appeared. Small houses, with rooms which can be entered from independent staircases commend themselves to my mind as far preferable from many points of view, as dwellings for the working classes; it is certain, however, that owing to the increasing value of land in the metropolis this desideratum is not yet to be attained. The height, too, of these modern model dwellings stands in the way of furnishing them with a constant supply of drinking water. The water must therefore be stored in cisterns of sufficient capacity to supply all but the lower floors, and this arrangement certainly is not in the direction of improved sanitation. In times of drought other and more serious inconveniences occur. Small children are not given the chance to breathe as much fresh air as they require, and they do not reap those advantages obtainable from sunshine which are absolutely necessary to ensure them becoming healthy men and women. I feel that my contention will be eventually demonstrated, and that the time will come when many so-called model dwellings will be condemned."

CHELSEA.—Mr. John Humphrey, chairman of the Bath Commissioners, recently opened the new baths and washhouses which have been erected by the commissioners at Kensal Town at a cost of £27,000. The building contains two swimming baths—one 80ft. by 30ft., and the other 60ft. by 25ft.—a large number of private baths and a laundry, with offices for the staff.

THE VITALITY OF PATHOGENIC GERMS IN DRINKING WATER.

By Dr. B. Meade Bolton, Princeton, U.S.A.

One of the most striking features of the bacteria is variability. These organisms are subject to variability of shape, of all these vital manifestations, such as fermentation, production of disease and of pigment, in the capacity of living in various media. They possess no characteristic not subject to variation. The anthrax bacillus—ordinarily a short, sharply-cut rod forming spores or resistant bodies under favourable conditions, and capable of producing a virulent infectious disease in man and animals—sometimes becomes so distorted in shape as to be unrecognisable under the microscope. It may be made to lose its power of forming spores and of producing disease. The diphtheria bacillus is sometimes a fine uniformly-stained rod; at others it appears as a large irregular nodular rod. Sometimes both ends are swollen and apparently distorted, sometimes one end alone. Again, the rod stains irregularly; the protoplasm is collected into clumps and granules in the cell membrane. The bacillus prodigiosus frequently resembles a coccus, and at others appears as a distinct rod or even a short thread. This organism, which ordinarily forms a deep red mass on the nutrient medium, frequently loses its power of producing pigment. Percy Franklin has found out that with certain bacteria it is possible to force them to produce certain products of growth by gradually introducing certain substances into the nutrient medium. I have found that the bacteria may be accustomed gradually to the presence of substances in the nutrient medium that would be sure to destroy or inhibit the growth. There is even evidence that the bacteria may be finally stimulated to increased growth by the gradual introduction of substances classed as germicides. But it is useless to multiply examples. The variability of the bacteria under the influence of external conditions is well recognised, and the sensibility of these to environment has been abundantly shown. This property must be ever borne in mind. It must not be forgotten that the bacteria are lining cells, and not chemical compounds. All cells have more or less individuality, and all agglomerations of cells have variable characteristics. This can be illustrated by any series of experiments with disinfectants. The use of a certain amount of the disinfectant may destroy many of the organisms, and yet leave many more unaffected. The same amount of the disinfectant may kill more of the organisms in one culture than in another. Hence we cannot wonder at the vitality of the bacteria in water. The typhoid fever bacillus has been found to live for thirty days in water into which it was introduced intentionally, and yet it is frequently found to die out much sooner than this in water.

In many experiments I have endeavoured to arrest the vitality of various pathogenic bacteria, and the discrepancy in results was a surprise and a disappointment. Sometimes they diminished and disappeared much more quickly than at others. Yet this is not to be wondered at. There are many factors that determine how long they are likely to remain. The number introduced, the special adaptability to water of those that are introduced, the temperature of the water, the number of other kinds of bacilli present, all are factors in the play. Again, the amount of organic matter that could furnish a supply of nutrition might be a factor. I have always found that pathogenic bacteria introduced into water disappear sooner or later. They do not multiply even in foul water from a shallow well, and fail even when this water was freed from other bacteria that is sterilised. I have been able to obtain a multiplication in water only after adding a certain amount of peptonised beef broth. It is necessary to add an amount of broth estimated to contain 67 milligrammes of organic matter to a litre of water before any growth can be obtained of typhoid bacillus, and the equivalent of 400 milligrammes of organic matter before any multiplication of the cholera organism can be obtained. This amount of organic matter is never found in the most contaminated water, and not only this, but the kind of organic matter used in the experiments is not found. What is found ordinarily would be less suitable for the typhoid and cholera bacilli than the carefully-prepared peptonised broth used in the experiments, and it may safely be stated that where water becomes contaminated with pathogenic bacteria these will disappear rapidly owing to lack of proper nutrition and to the conflict of other bacteria, the saprophytes, found always in contaminated water. There are bacteria that multiply even in distilled water, and these are the aquatic bacteria which quickly make the pathogenic form disappear. The latter are very choice in their food. We must prepare the media for their cultivation with great care, and they stand no chance in competition with the hardy saprophytes found in water. The pathogenic must be given conditions closely resembling those of the animal body to grow and multiply; the saprophytes, on the other hand, flourish at a lower temperature and with less elaborate food. This is the reason why the examination of water shipped to the laboratory is of no use. In a few hours it is changed as to its flora, some abundant at first are less so; others, few at the start, increase often enormously. It is an interesting experiment to examine water freshly caught, let it stand and examine at intervals. About two forms usually survive and increase very rapidly. One is a bacillus fluorescent, non-liquefacient, and a micrococcus, to which I gave the name micrococcus aqualilis. For this reason it is never worth while to attempt an analysis of shipped water.

Results are misleading. The danger from contaminated water arises from the use of the water very shortly after contamination. Of course, if there is a source of continuous contamination, then the water is dangerous at all times, and the organisms are easily found, as during the cholera epidemic at Hamburg and Altona. In case of typhoid the matter is peculiarly difficult and time-consuming. Again, another difficulty is the want of definite characteristics of typhoid bacilli themselves. The matter of contamination of water with this form is of more importance to us in this latitude, and it would be of the greatest value to be able easily to recognise this organism. Satisfactory results are not obtainable without the expenditure of a great amount of work and many precautions in the collection of samples, and immediately making cultures. I question the utility of one examination. A well may be free and con-

taminated at different times. The chief if not the only danger arises from surface contamination. If water filters through a soil it is purified. Now, during a dry season, there is little danger from the surface drainage. Only in case there is a crack or crevice leading from a privy vault or other source of contamination is there great danger of infection. Esmarch has shown that pathogenic bacteria rapidly die out in the soil within one or two days, so that it would be a difficult matter really to make the bacteria pass from a privy vault to a well through soil in which there are no crevices. Flugge is of opinion that infection of water is more apt to take place indirectly than directly. He does not deny any more than others that what the Germans call *massen infection* takes place from drinking water. In the case of typhoid fever Dr. Bolton always believed that danger of spreading the disease arises as much from indirect contact of food and vessels for food and drink, with the typhoid excreta, as from contaminated water. Finally, pathogenic bacteria usually have a brief life in water; under ordinary conditions multiplication and growth are not favoured; the danger of the spread of the disease in this way is transitory unless the source of contamination is continuous, as from a channel leading from a privy vault. Water is probably infected frequently after it is drawn and carried into the house for use just as food probably is.

Reviews.

Model Regulations and Bye-laws for the Drainage and Plumbing Work of Buildings; with Notes and Illustrations. Prepared under the supervision of the six District Councils in Scotland for the National Registration of Plumbers, and ordered to be published by the Congress held at Perth, 1897. Glasgow: James Walton and Co. 1s.

THE publication of this excellent little book is especially opportune at the present time. The new Public Health Act for Scotland came into operation on January 1st last, and under Section 181 of the Act Local Authorities in counties are for the first time empowered to make bye-laws relating to the construction, drainage, and inspection of all buildings in the districts under their jurisdiction. Such powers have long been possessed by the principal towns under their local Acts of Parliament, and the general Burgh Police Act conferred similar powers on the Commissioners of all Police Burghs in Scotland in 1892; so that the present provision of the new Public Health Act merely extends to every part of the country a power which has already proved so useful in urban communities. And now, to assist all Local Authorities, both Urban and Rural, in the framing of such bye-laws, and to ensure greater uniformity of treatment, we have to welcome the issue of this practical little publication, which may in truth be termed "The Plumbers' Code."

But though most Local Authorities will find the issue of these model regulations peculiarly timeous just now, when they are called upon for the first time to exercise their new powers of jurisdiction over the sanitary arrangements of buildings, it must be borne in mind that the publication is no hastily "got-up" one, in connection with the passing of the Public Health Act. On the contrary, it is a well-matured and most carefully considered body of rules, prepared by a committee of practical men as the result of four years of conscientious work. The committee was appointed in September, 1893, at a Congress in Aberdeen of Sanitary Authorities and others, in connection with the movement for the Education and National Registration of Plumbers. Its membership included Sanitary Inspectors, master plumbers, operative plumbers, architects, and others, from the six District Councils of Scotland—a membership which was thoroughly representative in character, and was a sufficient guarantee that the interests of no one class would be allowed to predominate, but that the one object aimed at should be the safeguarding of the public health. The bye-laws relating to drainage and plumbing work actually in force in all the chief centres of population were carefully prepared and digested, and everything that could be suggested by practical experience was added to the model rules. The product was finally submitted to the Eighth Annual Congress of Public Sanitary Authorities and Plumbers, held at Perth in September, 1897, and, after some further revision and adjustment, has now been published in its present form.

The history of the book and the auspices under which it has been published may well, therefore, lead us to regard it as authoritative, and as representing the latest and most up-to-date knowledge on the subject of which it treats. Nor after a careful perusal are our expectations disappointed. For the manner in which the work has been done we have nothing but praise. An introductory note briefly explains the statutory provisions under which the bye-laws must be framed. Then follows what we have called the Code itself, in sixty-three sections, dealing in detail with the drainage and every branch of plumber work, both of new and of existing buildings. Each section is accompanied by explanatory notes, in many cases of so thoroughly practical a character as to be of almost equal value with the rules themselves. The notes contain besides frequent references to the cognate sections of the Acts, as well as to the provisions of the bye-laws of the chief towns on which they are founded, thus enabling the reader to see at a glance how far these vary in different places. A set of twenty-seven carefully executed diagrams, illustrative of the regulations, concludes the book.

We should like, however, to modify the unstinted praise we have bestowed on the publication by one small word of criticism. It would have facilitated convenience of reference had there been marginal headings along with each section, similar to those in Acts of Parliament, briefly indicating the scope and contents of the section. This, we think, would have been a distinct advantage for purposes of reference; but beyond this trifling point we may be free with our commendation. The work has been done in a thorough and workmanlike manner. Every point connected with the drainage, the plumber work, and general sanitary arrangements of buildings has been minutely treated in the fullest light afforded by experience. Simple and unassuming in appearance, the book contains within its modest covers a store of practical knowledge, which, if thoroughly carried out, would go far to reduce disease in our midst. We have no hesita-

tion in saying that this useful little compendium will be found simply invaluable, if not, indeed, indispensable; not only to plumbers and Local Authorities, but to architects, engineers, Sanitary Inspectors, and, in short, to all connected with the building trade.

General News.

LEIGH.—The Council does not agree with the proposals made for a joint hospital, and intends to have a building of its own.

LANCASTER.—At the last meeting of the City Council the question of improving the sanitary condition of the town was discussed.

SANDBACH.—The Urban District Council has resolved to borrow £1000 for purposes of a water supply and a new road at Malkin's Bank.

LOWESTOFT.—Dr. T. St. Geo. Mivart has held a Local Government Board inquiry into an application to borrow £1400 for the extension of the sanatorium.

OSSETT.—The Local Government Board has forwarded the draft of a Provisional Order to amend the local Act of 1875 in regard to borrowing powers for waterworks and the investment of sinking funds.

LEITH.—The deaths registered within the burgh during the month of March numbered 137, being an increase of 41 on the preceding month, and an increase of 13 on the corresponding month last year, and showing a death-rate of 21·1 per 1000. There were three deaths from infectious diseases, viz., scarlet fever, one; erysipelas, one; measles, one. Under the Notification Act 91 cases of infectious diseases were notified.

REDCAR AND SALTBURN. — The Sanitary Authorities at Redcar and Saltburn have taken every possible precaution to guard against the introduction of small-pox, and up to the present their efforts in that direction have met with success. No cases of small-pox have been reported from either of the towns, and visitors who have been in the habit of spending their summer holidays at the pretty little seaside places have no reason to alter their plans.

BILSTON.—A Local Government Board inquiry was held recently into an application by the District Council for sanction to borrow £7000 for the purposes of water supply. Mr. Wassell, clerk to the Council, put in a statement showing that the total estimated cost of the waterworks was £53,750. This sum was 10 per cent. above the estimate, but the Council was perfectly satisfied with the expenditure. The loan now asked for was to cover the amount of the estimate.

LOWESTOFT.—The Corporation having decided to provide a refuse destructor for the borough, and fixed upon a spot known as Smith's Marsh for the erection, its proposals do not find favour with the inhabitants in the immediate neighbourhood, and a meeting was held recently to protest against Smith's Marsh being used for the purpose. It was agreed that a memorial be sent to the Town Council, and that the Council be asked to receive a deputation to support the prayer of the memorialists.

QUEENSBURY. — A Local Government Board inquiry has been held recently respecting the application of the District Council for permission to borrow £1500 to provide a water supply scheme for the mountain portion of the scheme.

BLACKWELL.—In consequence of the representations made by the Carlisle Rural District Council the Parliamentary Committee of the Town Council has recommended the Water Committee to extend the present water mains from Currock to Blackwell without delay.

Personal.

MR. W. WINDSOR has been appointed Inspector of Nuisances for the borough of Denbigh.

MR. J. R. HATFIELD has been appointed Medical Officer of the northern district of Forden union

Mr. J. E. HICKMAN has been appointed Medical Officer for the Coleford district of Frome union.

MR. W. J. PETCH has commenced duty as Surveyor to the Rawmarsh Urban District Council.

DR. WM. FAIRBANKS has been appointed Medical Officer of the workhouse of Wells union.

MR. H. BURTON has been appointed Medical Officer of Health for the urban district of Marple.

DR. J. W. SMITH has been appointed Medical Officer of Health for the urban district of Ryton.

DR. G. W. ROBERTS has been appointed Medical Officer of Health for the borough of Denbigh.

MR. G. R. COLLIN has been appointed Medical Officer for the Harrington district of Whitehaven union.

DR. JOSEPH FULLER has been appointed Medical Officer of Health for the Long Ashton rural district.

DR. S. G. NORRIS has been appointed Medical Officer for the western district of Llandilofawr union.

MR. F. G. SCOTT has been appointed Medical Officer for the Gillingham district of Medway union.

MR. JAMES WHITEHEAD has been reappointed Sanitary Inspector to the Rawmarsh Urban District Council.

Mr. J. B. HOLROYD has been appointed Inspector of Nuisances for the rural district of Hartsnene and Seals.

MR. J. B. HOLROYD has been appointed Inspector of Nuisances for the rural district of Ashby-de-la-Zouch.

DR. C. J. RENSHAW has been appointed Medical Officer of Health for the urban district of Ashton-upon-Mersey.

MR. GEORGE WILSON has been appointed Inspector of Nuisances for the urban district of Knaresborough.

MR. R. C. SPENCER, Horbury Wakefield, has been appointed surveyor to the Urban District Council at Belper.

MR. RIDDLER, of Stroud, has been elected surveyor and Inspector of Nuisances by the Urban District Council of Tewkesbury.

DR. BOND has been re-elected Medical Officer of Health for the rural district of Cirencester for the ensuing year.

MR. SAMUEL BROADHEAD has been appointed Inspector of Nuisances for the urban district of Milford Haven.

MR. A. D. FORBES has been appointed Medical Officer for the No. 7 district (Horsmonden) of Tonbridge union.

THOMAS PARTRIDGE, M.R.C.P., M.R.C.S., has been reappointed Medical Officer of Health for Stroud rural and Nailsworth urban districts, Gloucestershire.

MR. R. WEDGE, Sanitary Inspector of the Cannock Rural District Council, having resigned his position, Mr. H. M. Whitehead, surveyor to the Council, has been appointed to the position.

DR. SCARLYN WILSON has been appointed Medical Director and Consulting Medical Officer to the Borough Sanatorium, Hastings, at a salary of £300, rising by annual increments of £25 to £400.

IN consideration of Mr. Price, the Borough Engineer, Birmingham, resigning the office of Deputy Engineer to the Tame and Rea District Drainage Board the Public Works Committee recently recommended that his salary should be raised to £1000 a year. An amendment in favour of £800 found a good deal of support, and a vote disclosed the fact that the feeling of the Council was evenly balanced. The Lord Mayor gave his casting vote for the larger amount.

DR. JAMES PICHERN has been reappointed Medical Officer of Health to the Rawmarsh Urban District Council, although the Council refused to adopt his annual report in consequence of his having drawn their attention to the need of the (1) Adoption of Model Bye-laws (the present bye-laws were made in 1869, and not even in accord with the Public Health Act, 1895); (2) bye-laws under the Public Health Amendment Acts, 1890; (3) notification of infectious disease; (4) public slaughter-house. The Council has since adopted the Model Bye-laws.

Sewerage Schemes.

[TO MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

PLANS are to be prepared and notices given for the drainage of St. Andrew's-road, Henley.

A SCHEME for the disposal of the Coventry sewage will be shortly laid before the Warwick Urban District Council.

AS to the important sewerage scheme which the Rotherham Corporation has in hand, necessitating an expenditure of £80,000 or £90,000, the Mayor recently announced that so far as the sanction of the Local Government Board was concerned the Council was getting nearer the end, and it was hoped that very shortly the work would be commenced.

THE Vestry of St. George-the-Martyr has decided to borrow £4250 from the London County Council for re-drainage works.

AT the last meeting of the Sculcoates Rural District Council it was decided that an independent expert should be engaged to report on the Hessle drainage.

IN his annual report Dr. Day, the Medical Officer of Health, says the drainage of Fordington (the Maumbury Way District) still requires attention, as the cesspools are frequently overflowing.

AT a recent meeting of the Keynsham Urban District Council a resolution was subsequently passed requesting sanction from the Local Government Board to borrow £14,000 for sewerage works.

AT a recent meeting of the Brierley Hill Urban District Council, the Sanitary Committee reported that Mr. Wilcox, the expert engaged, had presented his report on a joint scheme with Kingswinford for sewage disposal. The scheme will cost, it is estimated, over £20,000.

THE Local Government Board has sanctioned the borrowing by Hastings Corporation of several sums, including £110 for works of surface-water drainage (new surface-water drain, Bohemia-road); £303 for works of sewerage (new sewers—Halton-hill, £181, and Exmouth-place, £122).

AT a meeting held on the 31st ult., the Manchester Rivers Committee decided to recommend the City Council to carry out the bacteriological system in spite of the Local Government Board, and borrow the money without the sanction of that body under the Public Health Act. The estimated cost of the plan proposed is £127,000.

A NEW drainage scheme prepared by Mr. W. H. Radford, A.M.I.C.E., of Nottingham, has been considered by the Horbling Parish Council. This provides for a sewage farm, and the cost is estimated at £1300 exclusive of the site and maintenance, calculated at about £40 per annum. An alternative and less expensive scheme has been suggested.

A LOCAL Government inquiry has been held recently at Wood Green touching the application of the Urban District Council for the sanction of the Local Government Board to the borrowing of several sums, including £1549 for works of sewerage. With the exception of the suggestion of two or three very slight modifications, the Inspector appeared to be favourably disposed to the application.

THE Public Works Committee's report states that plans have been submitted for the laying out of various estates at Balsall Heath. The City Surveyor has prepared a scheme by means of which the whole of this area can be effectually and satisfactorily drained, the existing sewerage being insufficient. The proposed sewer will be an oval brick sewer, 3ft. 4in. by 2ft. 6in., and a 2ft. 3in. stoneware pipe, the estimated cost amounting to £5500. The Committee recommends that it be authorised to have the sewer constructed.

THE Gildersome Urban District Council has made application to the Local Government Board for sanction to borrow an amended loan of £2500, for purposes of sewerage and sewage filtration works.

AT Johannesburg, the proposition to have the existing temporary pail-and-cart system done by contract has fallen through on account of the tenders presented being much higher than the present departmental cost of the work. The introduction of the new sewerage scheme, on account of which Mr. C. Aburrow, the town engineer, made his recent visit to Europe, is waiting on the solution of the water supply difficulty, and when this has been achieved, the former important question will be actively taken in hand. Public meetings have recently been enforcing on the Authorities the need for despatch in the introduction of these works.

COLONEL A. C. SMITH, R.E., Inspector to the Local Government Board, held an inquiry on the 17th ult. into an application of the Farnworth District Council to borrow £22,160 for works of sewerage and sewage disposal, and £9600 for works of private street improvements. Mr. D. Crossley, Clerk to the Council, gave evidence as to the street improvements to be carried out, and Mr. W. J. Lomax, C.E., of the firm of Lomax and Lomax, of Bolton and Manchester, the Council's engineer, described the proposed works of sewerage and sewage disposal, stating that the Mersey and Irwell Joint Committee required the Council to improve their effluent, and in order to accomplish this it was intended to considerably alter the present precipitation tanks, to construct a range of six roughing filters with an area of 1800 square yards, and a similar range of polarite filters, also 1800 yards in extent, which will be intermittently and automatically aërated by Messrs. Lomax's system, which has been successfully applied at Astley Bridge, Failsworth, Denton, Bowness, and other towns. The purified effluent from the filter tanks would be passed on to land to meet the requirements of the Local Government Board, which Board, when the international system is adopted, only require that land shall be provided at the rate of one acre for every 2000 of population. The population to be dealt with at the proposed works is about 26,000. There was no opposition to the scheme.

Lighting.

A DISCUSSION took place recently at the Clerkenwell Vestry with respect to electric lighting, and it was eventually resolved to take the necessary steps to obtain powers.

THE tender of Mr. T. W. Thomas, of Hammersmith, amounting to £3504, has been accepted by the Vestry for work in connection with the extension of the electric lighting station.

THE Rotherham Town Council has confirmed the decision of the Gas Committee to make important extensions to the gas plant, which would involve an expenditure of about £15,000 to £20,000. The work will be carried out as occasion requires

THE Exeter Council has decided to apply to the Local Government Board for permission to borrow £7000 for additional plant and cables for electric lighting.

A PROVISIONAL Order has been received by the Ossett Town Council authorising it to lay down electric lighting plant and to supply electricity within the borough.

THE Salford Town Council has agreed to apply for leave to borrow for electric lighting purposes a sum of £33,000, instead of the £50,000 proposed in a resolution passed recently.

THE proposal of the Gainsborough Gas Company to promote a Bill to enable them to supply electric power has been discussed by the Urban District Council in Committee. A special Committee has been appointed to obtain advice and information.

AT a recent meeting of the Barking Urban District Council it was reported that the provisional contracts for the erection of the electric light station and for the supply and erection of generating plant had been entered into, and that the remainder of the contracts would be completed shortly.

AT a recent Newington Vestry meeting it was agreed that application should be made to the Local Government Board for its approval to the use of the land leased to the Vestry, between Penrose-street and the depôt premises, for the erection of an electric lighting generating station for the parish.

THE Stoke-on-Trent Corporation recently inaugurated at the gasworks a new gasometer, which has been built, at a cost of £7000, by Messrs. W. C. Holmes and Co., of Huddersfield. The new gasometer will hold 430,000ft. of gas, and meets a thirty hours' maximum demand. It is on the telescopic principle, with three lifts, and has a steel tank 25ft. deep by 90ft. in diameter, which will contain 1,000,000 gallons of water.

AT a recent meeting of the Wednesbury Council the Sanitary Committee recommended that application be made under the Electric Lighting Acts for a Provisional Order for supplying electricity for lighting and other purposes. The Mayor suggested that the Corporation make certain conditions with the Electrical Corporation to supply the town with electricity. After a protracted discussion the recommendation was carried by eight votes to five.

THE Leigh District Council has decided to apply to the Local Government Board for sanction to borrow £10,235. The Gas Lighting and Electric Lighting Committee recommended at its last meeting that the estimated cost of the proposed extensions and alterations at the gasworks be approved, and that the clerk be instructed to apply to the Local Government Board for sanction to borrow £25,000 for the purpose of carrying out such extensions. It was resolved that the plans and estimate be submitted to a gas engineering expert.

Correspondence.

We do not in any way hold ourselves responsible for opinions expressed by our correspondents.

SEWAGE PURIFICATION.

(*To the Editor of* THE SANITARY RECORD.)

SIR,—I have just seen in your issue of March 25th a letter from Mr. Howatson suggesting the employment of heated air for the aëration of bacterial filters.

I do not quite know what his patent is, but I suggested this application of heated air in my paper contributed to the Institution of Civil Engineers in 1893.

I do not agree with him that the bacterial treatment is a violation of Nature's laws, as the greater part of the fertilising materials are present in the effluent from such filters in the form of soluble nitrates, which, if applied to the soil, provide the necessary nutriment for plant life in a form already prepared for its easy assimilation, while if the land is not in a condition to receive, or does not require the effluent, it could be turned into the stream without nuisance.—Yours faithfully,

SIDNEY R. LOWCOCK.

Birmingham, April 5th.

DISINFECTION OF ROOMS.

SIR,—It may be interesting to many of your readers in addition to myself, and of much importance to Sanitary Inspectors, to know which is the best means of disinfecting rooms after an infectious disease, say, for instance, scarlet fever.

Years ago we used Calvert's fumigator and carbolic acid 95 per cent., but the last few years we have been using sulphur 1 lb. to 1000 C.F.

An expert has now stated all that can be claimed for sulphur fumigation is the purification of the atmosphere, and that it does not destroy the germs that may be adhering to the walls, ceiling, &c.; therefore it has not our desired effect, and must be a mere farce. It would be a hard duty for a Sanitary Inspector to perform, if it lay in his power, to compel an owner of a house to remove the paper that had only been placed there a few weeks previously to the disorder appearing.

I should be pleased to know the legality of the subject, and also the views of those Inspectors who have practised different methods with success, as it is worse than useless to continue to use an article that is not capable of destroying the germs. I think if some moist material could be used it would prove more satisfactory than dry heat or fumes. I enclose my name and address.

SALUBRIOUS.

"SEWAGE DISPOSAL AND WHEAT GROWING."

SIR,—I am glad that your correspondent Mr. Bowler has inserted the thin end of the wedge—with your kind permission—*re* the enormous waste of national wealth at present going down our sewers by the water-carriage system now in vogue in the large towns of these islands. Your journal is ably conducted in the interest of sanitary science; but, inasmuch as every question has two sides, and an honest mean between the two sides, I sincerely hope you will open the pages of your paper to a discussion of both sides of the question, and that many of your very able correspondents will chime in with their quota of the views they entertain upon this very interesting subject.

A man may become a sanitarian from many motives, but no matter from what motive he becomes one, he must not close his eyes, nor steel his mind, against the questions of the day that surround him. The man who does so may be said to be on the high road to sanitary madness. It is because I wish to steer clear of any pitfalls that may be in the question, and that I wish to pursue an honest mean, that I address this letter to you.

I may set out by stating that I entertain the belief that midden privies have been, and can be again, so constructed as to render their contents quite innoccuous, and thus put an end to the squeamishness entertained by fastidious letter-writing and speech-making men and women of our own day against the chewed bread-and-beef contents of our much-abused midden privies. Now, the country is very good to the town—our supply of beef, bread, and milk comes therefrom; but how do we in the towns treat the country in return? I will now let Baron Liebig speak on this point: "The corn-growing agriculturist removes from a nectare (2½ acres) of his wheat field, in an average crop of corn of 2000 kilos., 70 lb. of the mineral constituents of the grain, of which 34 lb. consists of phosphoric acid, and 21 lb. of potash, and he supplies these to consumers in large towns. In an ox of 550 lb. weight the town receives 183 lb. of bones, containing nearly 120 lb. of phosphate of lime; in the flesh hide, and other parts of the animal 15 lb. of phosphates, which are identical with the constituents of the seeds of rye.

"The annual fluid and solid excrements of a million inhabitants of large cities (men, women, and children) weigh in the dry pulverulent state 45,000,000 lb., in which are contained 10,300,000 lb. of mineral substances, mostly ash constituents of bread and meat (not including 5,000,000 lb. weight of bones of the slaughtered cattle, &c., nor the mineral substances in the evacuation of horses, &c.). These human excrements alone contain 4,580,000 lb. of phosphates." (Page 218 of "Liebig's Letters on Modern Agriculture.")

So far, so good; but the evil does not end here. To-day, we stand face to face with a combination of powers arrayed against us. We have the fighting naval power to strike successfully, but the want of food at home paralyses our efforts in this direction; hence, the impotency of the efforts of our statesmen.

I am quite prepared to believe that the health of our urban population would not suffer any more than at present were our water-carriage systems—as far as w.c.'s are concerned—eliminated from our midst, and the produce of our privies again turned on the land once more. Certainly they would have to be differently and better constructed than they are at present.

Thanking you in anticipation.—Yours faithfully,

SANITARIAN.

THE London County Council has just opened another block of dwellings in the "Boundary-street area," Shoreditch. It is stated that every room has been taken, and that there were scores of disappointed applicants.

ANALYTICAL ANOMALIES.

CERTAIN alleged difficulties between the analyses of Dr. Frank L. Teed, analyst of the Islington Vestry, and those of the Somerset House officials, have recently been the subject of public comment. It is alleged that in the course of a fortnight three separate analyses of Dr. Teed's were proved to be inaccurate when the samples dealt with were referred to Somerset House.

Dr. Teed has been interviewed upon the subject at his laboratory in Victoria-street, Westminster.

"There are certainly three cases," said Dr. Teed, "in which my results differ from those obtained by Somerset House; but as to their having been 'proved to be inaccurate,' that is quite another matter.

"The first was a sample of lard, which I certified to consist entirely of fats other than lard. Somerset House found the sample genuine, and so did Mr. Otto Helmer, who analysed the sample for the defence. I exchanged samples with Mr. Helmer, and found his sample genuine, while he found mine adulterated. The sample analysed by me could not have been mixed with any other in my laboratory, as I had no other sample of lard there at the time.

"There is, therefore, a mystery about this case which is not easily explained. It may have been that only one end of the piece of lard was adulterated, and that in dividing it into three parts the adulterated end fell to my share. There are also other explanations, which one can hardly say anything about, whatever one may think.

"The second case was one of coffee. I found 90 per cent. of chicory, whereas Somerset House certified to only 52 per cent. I determined the percentage of chicory by Graham Stenhouse and Campbell's method, which was elaborated by them for the Inland Revenue department. Somerset House uses another method, for which they have been asked, a demand to which they have failed to reply.

"The third case presents very little difficulty. It was a sample of milk, in which I found 6 per cent. of added water. The Somerset House experts certified that they could find no evidence of the presence of added water, but they gave figures which showed on their own standard 2 per cent. of added water. I examined this milk when it was fresh; Somerset House only received it when it was highly decomposed, having, in fact, been drawn from the cow upwards of one month before they received it. Their results must, therefore, be looked upon as partaking of the nature of guesswork.

"Of course, it is unfortunate that three cases of this nature should occur one after the other. For the last ten years I have not had any of my results questioned by Somerset House. I am, however, very glad that a question is to be asked in the House, because it may help to compel Somerset House to publish the standards by which it works, instead of keeping them secret.

"I may add that in the milk case the Vestry is carrying it to the Queen's Bench, in order that the admissibility of the Somerset House certificates as evidence may be finally determined."

Notes and Queries.

Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C 1

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

1034.—SANITARY INSTITUTE EXAMINATIONS: BOOKS FOR SAME.—"J. H. H." writes: "Do you publish any Guide to the Examinations of the Sanitary Institute, recommending books necessary for same? If not, what books do you recommend?"

Answer.—We do not know of any Guide-book to the Sanitary Institute Examinations. The following books may be recommended:—Reid's "Practical Sanitation," price 6s.; "Model Answers to Examination Questions for Sanitary Inspectors," price 2s.; Maxwell's "Calculations of Areas and Cubic Space," price 2s.; Maxwell's "Ventilation, Lighting, and Heating," price 2s.; Knight's "Diagramettes of Hygiene," price 1s.; Vacher's "Food Inspector's Handbook," price 2s. 6d.; Davies and Yabbicom's "Notes on the Factory and Workshops Acts," price 4d., and Taylor's "Sanitary Inspector's Handbook," price 5s. Any of the books named may be obtained from the Sanitary Publishing Company on receipt of the published price.

1035.—HOUSE DRAINAGE: DRAIN OR SEWER.—"F. J. A." writes:—"(1) Has the owner of property on plan enclosed the right to connect his house drain with the drain running down such road constructed by a private owner and connected with the main sewer? (2) Does the fact of two separate houses occupied by different persons, but owned by one person, make the drain in the private road a sewer; and, if so, does it not as such belong to the Urban District Council, irrespective of the person who constructed it? (3) Can my Council compel the owner of houses marked A to construct a separate drain in the private road to the main sewer, a distance of 80 yards; or can they only compel him to make a cesspool on his own land—that is, if he cannot agree with the adjoining owner to pass through his drain, or if it is not a sewer within the meaning of the Public Health Act, 1875, and the Public Health Act Amendment Act, 1890, which is adopted here?"

Answer.—(1) If the drain in the private road as at present constructed is used for the drainage of one house only, the owner of the houses proposed to be drained has not a right to connect his drain or drains thereto. If, however, the drain referred to receives the drainage of two or more houses, such a drain is a sewer, notwithstanding that it was constructed by a private owner; and the owner of the proposed new drainage may connect thereto without paying for the privilege. (2) Yes; such a drain is a sewer, vested in the Urban Authority. (3) The Council cannot compel the connection of a drain to a sewer when the latter is more than 100ft. from the site of the house to be drained. When no such means of drainage are within that distance, then the Local Authority may require the owner to construct a cesspool, into which the drains may empty—see Sec. 23 of the Public Health Act, 1875. The cleansing of the cesspool will devolve upon the occupiers, although the drain leading into it may receive the drainage of two or more houses.

1036.—THE PASTEUR-CHAMBERLAND FILTER: PARTICULARS.—"M. O. H." writes:—"Can you give me

any information about the Pasteur-Chamberland filter for purification of domestic water?"

Answer.—The Pasteur-Chamberland filter, the sole licensees and makers of which are Messrs. J. Defries and Sons, Ltd,, 147, Houndsditch, London, E.C., is the outcome of experiments made by M. Pasteur, who found that plates of plaster of Paris were effective in sterilising fluids in his laboratory work, and it afterwards occurred to M. Chamberland, his principal assistant, to apply the material used for the filtration of drinking water; hence the name given to the filter. The filtering medium now used is a specially-prepared fine-grained unglazed porcelain in the form of a cylinder, which is open at the lower end only, where it is provided with a glazed porcelain nozzle. The cylinder is enclosed in a case, through the bottom end of which the nozzle passes, and communicating with the top end there is a pipe with a screw socket for fastening the filter on to a water tap. The water enters the outer case, filters through the cylinder into its interior cavity, and escapes through the nozzle at the lower end. This is the form known as the tap filter, which works under pressure, but there are numerous other forms. As a result of two valuable sets of experiments to test the power of filters in removing micro-organisms from water, conducted, on the one hand, by Dr. H. H. Johnston, at the Public Health Laboratory of the University of Edinburgh, and, on the other hand, by Dr. Sims Woodhead and Dr. Wood for the *British Medical Journal*, it is stated that the experiments conclusively proved that the Pasteur-Chamberland filter is the best on which reliance can be placed for permanently sterilising drinking water. Our correspondent would probably find Dr. Rideal's "Water and its Purification," price 6s., a most useful book on the subject in which he is interested. The book may be obtained from the Sanitary Publishing Company, 5, Fetter-lane, London, E.C., on receipt of the published price.

1037.—Sale of Food and Drugs Acts: Appointment of Officer.—"X. Y. Z." writes:—"(1) Can an Urban District Council appoint their Inspector of Nuisances as an Inspector under the Sale of Food and Drugs Acts? (2) Is it necessary that such appointment be confirmed by the Local Government Board? (3) What manuals are the best to explain the duties and the legal powers possessed by such Inspectors? (4) Can an Inspector of Nuisances so appointed demand a salary for performing the duties of an Inspector under the Sale of Food and Drugs Acts?"

Answer.—(1) Yes. Where one-half of the salary of the Inspector of Nuisances is paid to the Urban Authority, under Sub-section 2 of Sec. 24 of the Local Government Act, 1888, the duties of the Inspector are prescribed by Article 9 of the Order of the Local Government Board, of March 23rd, 1891, and Sub-section 8 of this Order provides that the Inspector of Nuisances "shall, when and as directed by the Sanitary Authority, procure and submit samples of food, drink, or drugs suspected to be adulterated to be analysed by the analyst appointed under the Sale of Food and Drugs Acts, 1875, and upon receiving a certificate stating that the articles of food, drink, or drugs are adulterated, cause a complaint to be made, and take the other proceedings prescribed by that Act." It is also provided by Sec. 13 of the Public Health Act, 1875, that "any Medical Officer of Health, Inspector of Nuisances, or Inspector of Weights and Measures, or any Inspector of a Market, or any Police-constable under the direction and at the cost of the Local Authority appointing such officer, Inspector, or Constable, or charged with the execution of this Act, may procure any sample of food or drugs, and if he suspects the same to have been sold to him contrary to any provision of this Act, shall submit the same to be analysed by the analyst of the district or place for which he acts, or, if there be no such analyst, then acting for such place, to the analyst of another place," &c. (2) It will be seen from the above that by virtue of his appointment, an Inspector of Nuisances is also Inspector under the Sale of Food and Drugs Acts, and no additional appointment or confirmation is necessary. (3) Bell and Scrivener's "Sale of Food and Drugs Acts," price 4s. 6d., obtainable of the Sanitary Publishing Company, will be found an excellent manual for the use of Inspectors. (4) Inasmuch as it is a part of the duties for which he is appointed, an Inspector of Nuisances will not be able to require an additional salary.

1038.—Public Health (Scotland) Acts: County Sanitary Inspector: Powers.—"R. B. M." writes:—"What position does a Sanitary Inspector of a County legally occupy in connection with the introduction therein of (*a*) an adequate and suitable water supply for the population; and (*b*) as to the necessary works for the treatment of sewage? Will you please state whether the above duty is imposed by statute or bye-law?"

Answer.—(1) By the Local Government (Scotland) Act (1889), Sec. 52, power is given to the Council of every county to appoint and pay a Medical Officer or Medical Officers, and a Sanitary Inspector or Sanitary Inspectors, and also to effect arrangements for rendering the services of such officers regularly available in the district of the District Committee, on such terms as may be agreed, and the Medical Officer or Sanitary Inspector shall have, within such district, all the powers and duties of a Medical Officer or Sanitary Inspector appointed by a District Committee. And by Sec. 53 of the Act the Medical Officer and Sanitary Inspector are required to send copies of every report required to be made under the regulations of the Board of Supervision (which they are by this section authorised to make) to the County Council. The County Council are also empowered—where it appears to them that the Public Health Acts have not been properly put in force within any district, or that any other matter affecting the public health of the district requires to be remedied—to cause a representation to be made to the Board of Supervision on the matter. From the above it will be seen whence the County Council obtain their power to appoint Sanitary Inspectors, and also how they may exercise their powers of representation to the Board of Supervision against defaulting Authorities. The Board of Supervision framed Model Sets of Bye-laws, as authorised by Sec. 8 of the Public Health (Scotland) Act, 1867—now substituted by Sec. 15 of the Public Health (Scotland) Act, 1897, for regulating the duties of Sanitary Inspectors—which bye-laws are adopted, we believe, by most of the County Councils; and by Clause 1 of these bye-laws the Sanitary Inspector is required to keep himself informed by inspection of the sanitary condition of the county, particularly as regards drainage, water supply, and the existence of nuisances; and by Clauses 9 and 12 he is required to report to the County Council whenever it appears to him that the provisions of the Public Health Acts have not been properly put in force, and is also to prepare an annual report as to the condition and efficiency of all sanitary and drainage works, &c., within the county.

1039.—The Porter-Clark Process of Softening Water.—"L. J." writes:—"Would you please oblige me with the address of Mr. Porter Clark, the authority upon the process of softening hard water?"

Answer.—Our correspondent is advised to read up the different processes of softening water. There is no Mr. Porter Clark in existence, nor has been, whose name is connected with the process of softening water. The Porter Clark process is so named from the fact that a Mr. Porter, in 1876-7-8, took out patents for softening water which combined some improvements made by him on the well known process invented by Dr. Thomas Clark, of Aberdeen, who in 1841 had taken out a patent for

softening water by the addition of lime; hence the name or description—the Porter-Clark process—patented under this name. We recommend our correspondent to procure Dr. Rideal's "Water and its Purification," price 6s., obtainable from the Sanitary Publishing Company, wherein he will find the different processes of water softening described.

1040.—ORDERS OF LOCAL GOVERNMENT BOARD AND CANAL BOATS ACTS.—"J. F." writes:—"Will you please inform me what are the duties of an Inspector of Nuisances as laid down in the General Order of the Local Government Board issued to Urban and to Rural Sanitary Authorities, March, 1891? Also, what are the conditions under which a canal boat is required to be registered, and the objects of the Canal Boats Acts, 1877 and 1884?"

Answer.—We have not space at our disposal to detail the Orders of the Local Government Board nor to recite the provisions of the Canal Boats Acts. The information, however, will be found in Taylor's "Sanitary Inspectors' Handbook," price 5s., or Reid's "Practical Sanitation," price 6s., either of which books will be found most useful to our correspondent. The books may be obtained from the Sanitary Publishing Company, 5, Fetter-lane, London, E.C., post free, on receipt of the published price.

1041.—ACETYLENE GAS: APPLICABILITY FOR DISTRIBUTION.—"A. E. B." writes:—"A burgh of upwards of 2000 inhabitants have adopted the Gas Supply (Scotland) Act, 1876, and acquired works in a dilapidated condition from a company. Before proceeding with repairs, it has been suggested that the burgh could be probably as safely and more economically lighted by acetylene gas, distributed from one centre through the street mains in the same way as coal gas. The length of street mains would be about 7000 yards, and about 1000 lights would be required. Query:—(1) Do you know of any town about the size of above which is lighted throughout from one centre by acetylene gas? (2) Can acetylene gas be stored in the same way as coal gas? (3) Would it waste by evaporation in pipes during the daytime? (4) Is it more dangerous than coal gas in case of escape? (5) What are the Board of Trade regulations with regard to its use? (6) In your opinion, are the provisions of the Burgh Gas Supply (Scotland) Act applicable to rating and charging for acetylene gas in the same way as they are for coal gas?"

Answer.—(1) We do not know of any town lighted with acetylene gas. The manufacture of this form of gas is still in its experimental stage, and we doubt whether there is in the kingdom a gasworks forming a centre of supply for acetylene gas. (2) Hitherto, we believe, the gas-producing plants for acetylene are small and portable, the gas being generated only as fast as it is required for consumption. We do not know of any form of plant which provides for storage of acetylene gas. (3) We presume our correspondent requires to know whether the gas will condense, not evaporate. We have no means of ascertaining, but should assume that this will be the case. (4) Yes. (5) We are not aware. (6) The Burgh Gas Supply (Scotland) Act has not contemplated the use of gas other than coal gas, and we do not see how the provisions of Sec. 59 as to testing quality of gas can be made to apply to acetylene gas.

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Contracts Open.

The dates given below are the latest up to which tenders can be received.

METHLEY (YORKS). — April 18th. — Sewers.—John Richardson, Esq., J.P., Methley Park, Leeds.

BLABY (LEICS).—April 18th.—Scavenging, &c.—Mr. B. A. Shires, clerk, Alliance-chambers, Municipal-square, Leicester.

KNOTTINGLEY (YORKS). — April 18th. — Sewerage Works.—Mr. John Richardson, M.I.C.E., engineer to the Council, 5, Central Bank-chambers, Leeds.

WIMBLDON.—April 18th.—Sewers, &c.—Mr. C. H. Cooper, engineer to the Council, Broadway, Wimbledon.

LONDON, S.W.—April 20th.—Sewer.—Mr. Charles Botterill, surveyor, Town Hall, Walham Green, S.W.

BIRMINGHAM. — April 21st. — Sewers. — Mr. John Price, city surveyor, Council House, Birmingham.

GREENOCK.—April 21st.—Sewers, &c.—The Master of Works' Office.

EDINBURGH.—April 23rd.—Electric Lighting.—Mr. R. Addison Smith, clerk and treasurer, 19, Heriot-row, Edinburgh.

HAWORTH (YORKS). — April 25th. — Scavenging. — The Council's Office, Mill Hey, Haworth.

WATERFORD. — April 25th. — Sewers. — Mr. M. J. Fleming, borough surveyor.

EGREMONT (CHESHIRE).—April 26th.—Sewers.—Mr. W. H. Travers, Public Offices, Church-street, Egremont, Cheshire.

STAPLEFORD AND SHARDLOW. — April 27th. — Sewerage Works.—Mr. W. H. Radford, C.E., Angel-row, Nottingham.

WINCHESTER. — April 30th. — Lighting. — The Surveyor's Office, Guildhall.

Vacancies.

ASSISTANT ENGINEER (LONDON, S.E., April 18th).—For the Vestry of Lambeth. Wages 35s. per week. Mr. Henry J. Smith, Lambeth Vestry Hall, Kennington-green.

ASSISTANT SURVEYOR (LONDON, W., May 2nd).—For the Vestry of Paddington. Salary £300 per annum, rising by annual increments for each year of approved service of £25 to £500 per annum. Surveyor's Department, Vestry Hall, Paddington.

BUILDING INSPECTOR (LITHERLAND, LANCS, April 16th).—For the Urban District Council. Salary £110 per annum. Messrs. North, Kirk, and Cornett, clerks to the Council, 15, Lord-street, Liverpool.

ENGINEER (SALISBURY).—Wages £1 5s. per week. Mr. Francis Holding, clerk, The Workhouse.

GASWORKS MANAGER (HUNGERFORD).—The Secretary, the Gasworks.

HIGHWAY SURVEYORS (DOCKING, NORFOLK, April 18th).—For the Rural District Council. Salary £80 per annum. Mr. J. A. Stoughton, clerk, Workhouse, Docking.

SEWAGE WORKS MANAGER (ATHERTON, LANCS., April 27th).—For the Leigh and Atherton Joint Sewerage Board. Mr. Daniel Scholfield, clerk, Atherton.

SURVEYOR, &C., (SOUTHWOLD, SUFFOLK, April 20th).—For the Corporation. Salary £60 per annum. Town Clerk, Town Clerk Office, Southwold.

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COMPETITIONS.

CRICKLADE (WILTS), April 30th.—Water Supply Plans. —The Cricklade and Wootton Bassett Rural District Council invite engineers to forward a report, with plans and estimates, for furnishing an effective system of water supply to the town of Cricklade, Wilts, exclusive of the cost of the land or easements, but inclusive of all other expenses. Premiums of £21 and £10 10s. will be given for the plans which the Council shall adjudge to be first and second in order of merit. Mr. Harry Bevir, clerk, Union Offices, Wootton Bassett.

FORMBY (LANCS), July 1st.—Sewerage Scheme.—The Formby Parochial Committee invite competitive schemes for the sewerage of a portion of the township of Formby. Premiums are offered amounting to £100 for the scheme considered first in order of merit, £50 for the second, and £25 for the third. Mr. J. H. Havelock Sutton, Piercefield-road, Formby. A professional assessor will be appointed to adjudicate upon the plans.

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DR. TIBBLES' VI-COCOA.

ARTICLE No. 4.

ITS SUPERIORITY.

THE enormous sale of cocoa and chocolate both in this country and on the Continent indicates that, as a beverage, cocoa meets a public want. The large number of restaurants that have sprung up during the last few years, where non-intoxicating liquids, such as milk, tea, coffee, cocoa, chocolate, and aërated waters form the principal drink, and the success which has attended these enterprises, shows that there is a growing taste for beverages that "cheer but do not inebriate." The necessity of some stimulant to overcome the depression of spirits which is the natural consequence of the monotonous work, sedentary occupations, and impure air, which are the daily lot of millions in our large cities, arises, in the first place, from the fact that owing to the want of vigorous exercise a sufficient amount of oxygen is not taken into the lungs. The power of the heart to circulate the blood to the extremities depends in great measure upon the blood being properly aërated when it reaches the heart from the lungs. The heart beats more or less strongly in proportion to the amount of oxygen taken into the blood. When this aëration is unattainable, dulness of brain and inertness of body are the result, and some stimulant is instinctively sought to remedy the evil by stimulating the heart's action. Most of the beverages which are largely used throughout the tropical and sub-tropical regions of the globe, where the heat and moisture of the climate indispose to active exertion, contain, as an active principle, the body known as caffeine.

This is contained in coffee, tea, Paraguay tea, and Guarana and Kola nuts, all of which are used in different countries as a stimulant.

With the exception of Kola nuts, these all contain small quantities of substances which in some constitutions produce unpleasant effects. Thus tea may produce nervousness and symptoms resembling gastric catarrh; coffee may produce constipation; guarana acts as a purgative in those unaccustomed to its use; and Paraguay tea has a flavour to which Europeans do not easily get accustomed, and which in some persons produces nausea.

Kola nuts are not known to produce any disagreeable symptoms, but are lacking in aroma.

By mixing Kola with cocoa, therefore, the stimulant action of the caffeine they contain is communicated to cocoa without any corresponding drawback. Kola has the advantage, also, of containing about three times as much starch as cocoa, and when to this mixture malt is added, the starch is rendered soluble by a peculiar ferment called diastase, which occurs in malt, and thus the cocoa is rendered more nutritious.

The further addition of a carefully prepared extract of hops gives the well known sedative and tonic effect characteristic of the plant, and which is particularly useful in cases of weak digestion, in which tea would be apt to disagree.

Concerning Kola nuts, the Director of the Public Gardens and Plantations remarks in the Annual Report for 1883: "Kola nuts are said to have wrought very remarkable cures for dyspepsia and allied disorders, and are prepared for this purpose in the same manner as cocoa and chocolate. Some people use the Kola nut at breakfast regularly in this manner, and consider it superior to anything else of its kind."

Surgeon R. H. Firth, in the well-known medical journal, the *Practitioner*, states: "As an infusion, with milk and sugar, Kola powder is an efficient substitute for tea and coffee, being, especially for those affected with diarrhœa, superior to either. Its cultivation is likely to meet with success." And further, on p. 257: "These nuts are likely to take their place in the market as furnishing a nutrient and stimulant beverage. In addition to their nutritive and stimulant properties there is the probability that a chocolate prepared from them will more readily agree with delicate stomachs."

Professor E. Heckel, of the Institute Botanico-Geologique Coloniale de Marseilles, in an elaborate and exhaustive treatise on the Kola nut, entitled, "Les Kola Africaines," p. 290, gives the result obtained by Dr. Bertram in experiments made with Kola chocolate upon an entire battalion of soldiers, as follows: "(1) It is truly a food, and strengthens the vital forces; (2) it clearly has a stimulant property in exciting muscular action in men, which becomes evident in the fact that the charge and the walk of the soldier are more vigorously performed; (3) that the stimulant action lasts several hours, and that no depression follows its use."

Dr. Dujardin Beaumetz, a well-known physician in Paris, says (*Medical Bulletin*, October, 1884): "Naval surgeons have employed Kola with success in the chronic diarrhœa of hot climates, and its use is indicated in cardiac affections and cachexia. Good effects have been observed in these cases, in which it acted as an astringent tonic."

The *Pharmaceutical Record* (June, 1890, p. 226) states: "The German War Office, during the autumn manœuvres of last year (1889) has ordered thirty tons of the Kola nut for consumption in the place of coffee, tea, and cocoa. . . . It can be safely used by sufferers from indigestion and nervous or bilious headache. Statesmen, athletes, brain workers under tension of their powers, can use it advantageously."

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J. LEACH,
Town Clerk.

Town Hall, Rochdale,
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NOTICE.—The Annual Subscription to this Journal has been raised to 12s. 6d. to all NEW Subscribers. NO ADVANCE will be made to our friends whose names were entered on our Subscription list prior to March 31st, so long as they continue to subscribe.

THE

Sanitary Record,

APRIL 22, 1898.

CROWN PRIVILEGES.

The State exists for the people, *i.e.*, the nation, and it would be intolerable if the freedom of action of the administrative or executive departments of the Government should be at the mercy of factious, obstructive, or malicious individuals. It is expedient for the public safety that the Crown should have the power to appropriate inventions in explosives, in fire-arms, or other appliances of war, for a reasonable consideration, and there are officials, as the members of the diplomatic services of all countries, whose persons must be held sacred. But it is, on the other hand, nothing less than a scandal that all buildings, premises, and vessels being the property of, or even leased or hired by the Crown, not only for purposes of national defence, but for such as the accommodation of the local police or post-office business, should be exempt from the inspection or control of the Sanitary Authorities, without any guarantee being given that their condition shall not be a danger to the health of the employés, or even of the surrounding houses. Nay, more, there is nothing to prevent the officer in charge from concealing cases of infectious disease on the premises, and thus setting up a local epidemic. The mouths of the persons primarily aggrieved are closed, but from time to time unofficial and confidential complaints reach us as to nuisances which would not be tolerated on private property. It is not long since the person in charge of the post-office at 5, City-road was censured for having allowed the Sanitary Inspector to enter. The Vestry of St. Luke's served an intimation, followed by a statutory notice for the abatement of serious sanitary defects, but the Worship-street magistrate expressed, with regret, his inability to issue an order, and despite the exposure the Post-office authorities declined to act. Then for more than a dozen years the condition of the Central Telegraph Office has been disgraceful, and the only place where the operators can take any refreshment is a dark, dirty underground room, adjoining the w.c.'s and lavatories, which has acquired the name of "Cockroach Hall." Again, while the proprietors of places of public entertainment are often put to great expense in providing sufficient means of exit in case of fire, there is in the Central Office but one winding staircase, admitting not more than two men to pass abreast, along which at eight p.m. every day 900 pass out and 250 in at the same time. "Cæsar's wife should be above suspicion," and if the Medical Officer of Health and Sanitary Inspector must, on political grounds, be excluded, the control and sanitary supervision of all Crown property should at least be committed to some competent and independent officials, as the Medical and Engineering Inspectors of the Local Government Board. It is, however, but fair to add that despite the special exemption from notification of infectious disease in Sec. 55, sub. 7, of the London Public Health Act, a recent circular of the Local Government Board permits it as a matter of grace, not of right, though the interference of the Sanitary Authority in respect of "nuisances" is still prohibited.

Notes.

The Medical Officers' Society.

Among the numerous organisations of sanitary workers, that of the Incorporated Society of Medical Officers of Health occupies an important place. It has just brought its session for 1897—8 to a close, after a useful series of meetings, which have been recorded in these columns. Dr. Seaton, the well-known Medical Officer of Health to the Surrey County Council, will next

October vacate the presidential chair in favour of Dr. Edmund Gwynn, the equally well-known Medical Officer of Health for Hampstead. This Society, we are glad to notice—unlike many scientific bodies—is eminently practical, and at its gatherings and in its operations there is a pleasing absence of that professional jealousy which sometimes influences the professional mind. In view of the important position Medical Officers of Health occupy in the sanitary world, this is an evidence of the possession of a single eye to the public good, and it is therefore to be hoped that the Society will long flourish.

Medical Officers of Health and Meat Inspection.

A Medical Officer of Health is not enabled to refuse to inspect and examine meat believed to be unsound, except on payment of a fee, when asked to do so by the Inspector of Nuisances. Such is the opinion recently given by the Local Government Board to the Burnley Rural District Council, who sought their opinion in consequence of the Medical Officer of Health declining to examine a carcase of a cow, which the Inspector found had evidences of having suffered from tuberculosis. We do not see what other opinion could have been given, for the Orders of the Local Government Board regulating the duties of the Inspector of Nuisances and the Medical Officer of Health are, we should have thought, sufficiently clear to have rendered the matter, both to the Medical Officer and the Council, free from doubt. By Clause 7 of the Order as to the duties of an Inspector, it is provided that, "in case of doubt," before seizing any carcase apparently unsound, and intended for the food of man, the Inspector "shall report the matter to the Medical Officer of Health, with the view of obtaining his advice thereon." And by Clause 8 of the Order, relating to the duties of the Medical Officer, it is provided that "in any case in which it may appear to him to be necessary or advisable, &c., he shall himself inspect and examine any animal, carcase, &c. . . . And if he finds that such animal or article is diseased or unsound, or unfit for the food of man, he shall give such directions as may be necessary for causing the same to be dealt with by a justice," &c. Generally, we think, Medical Officers of Health are disposed to take a broad view of their duties, and are rightly imbued with a full sense of the responsibility of their office, which is to keep themselves informed, and to advise the Sanitary Authority on all matters affecting the health of the district. In such a matter as the one we have referred to, the responsibility of the Medical Officer is, or should be, greater than that of the Inspector; and we hope, and believe we are right in assuming, that such misinterpretations of his duties as is shown in this case are very rare.

The New Vaccination Bill.

The course adopted by the Government in their new Vaccination Bill, with regard to making vaccination compulsory, is evidently exciting a good deal of dissatisfaction in the country. Their disregard of the recommendation of the Royal Commission on the question of compulsion has aroused the bitterest anger of the uncompromising opponents of the vaccination law. Of course there are none so blind as those who will not see, and the opponents of the Government measure refuse to admit that the universal adoption of calf lymph will rob vaccination of its dangers. They plainly limit their belief and hope that if the Bill becomes law, it will be found to be unworkable, because either Boards of Guardians will decline to prosecute, or magistrates will refuse to convict. On this point, however, the Government must be firm. Difficulties may no doubt be expected in many places in enforcing the law, but when once the law is passed, after mature deliberation, it should be made perfectly clear that it *must* be observed.

The Extension of the Age Limit.

A Public Vaccinator, writing to the *Daily Chronicle*, states it as his opinion that the extension of the age limit for compulsory vaccination from three to twelve months will result in a large increase in the number of "unaccounted for" cases. The proportion of these cases which escape the vigilance of the vaccination officers is at present about one-fifth of the total number of children born in England and Wales; and it is contended that, if the compulsory age is extended to one year, this proportion is likely to be trebled. This argument, however, overlooks the fact that the extension of the age limit should very materially lessen the risks attendant on vaccination during the tender years of infancy, and should therefore tend to obviate the very natural fears of parents, which are at the bottom of all the opposition to the existing practice. And if a healthy public feeling grows up as to the wisdom of vaccination, and still more so as to its safety under a carefully administered law, the number of "unaccounted for" cases, instead of increasing, may rather be expected to diminish.

Result of the Battersea Vaccination Inquiry.

The Wandsworth and Clapham Board of Guardians have decided to terminate the engagement of Dr. Joseph, the Public Vaccinator, in consequence of the findings of the jury at the recent Battersea vaccination inquiry. It will be remembered that the inquiry related to the deaths of three children, which the jury found to be due to erysipelas, transmitted to them by vaccination; and the jury also added their opinion that Dr. Joseph, who vaccinated the children, had not exercised due care in the operation, and had omitted to observe some of the regulations prescribed by the Local Government Board. The case was a most unfortunate illustration of the dangers that attend the slightest carelessness in arm-to-arm vaccination, and offers a forcible argument in favour of the adoption of calf lymph, as proposed by the Government. Besides the three children who died, four others suffered severely; and the Board of Guardians have resolved on the very unusual step—subject to the sanction of the Local Government Board—of awarding £7 each to the parents of the deceased children, and £5 to the parents of the others, by way of compensation.

Our English Prison System.

One of the last measures of the session brought forward by the Government was the Home Secretary's Prisons Bill, which, in spite of the violent attacks directed against it,

chiefly from the Irish benches, was read a second time without a division. The subject of our prison system is one regarding which a good deal of popular ignorance prevails. One hears the opinion frequently expressed that the conditions of prison life now-a-days—unlike what they used to be in a former generation—are such that the average criminal is much better housed, and fed, and clad, than when he is at liberty. Indeed, from the sanitary point of view, he is supposed to have no reason to complain, and the healthiness of our prison *régime* is often rather indiscriminately applauded. To a certain extent this view is perhaps correct; that is, at least, in regard to the ordinary criminal population, whose sanitary standard is necessarily a low one, as they belong to the lowest stratum of society. But the defects of our prison system, though not so bad as they once were, are still sufficiently glaring. There is considerable difference of opinion as to the lines on which reform should proceed, but the necessity of reform of some kind or another is admitted on all hands by those who have any acquaintance with the subject.

The Government Measure.

The present Bill is the outcome of the report of a Departmental Committee appointed by Mr. Asquith, and presided over by Mr. Herbert Gladstone. Some of the reforms recommended by that Committee have already been adopted by the Home Secretary; for others legislative sanction is required, and they are dealt with in Sir Matthew White Ridley's Bill. So far as these are related to the principles which underlie our corrective system—principles which really form part of the great social question—they fall beyond the province of this journal to discuss. Such are those which treat of the differential treatment of prisoners, the shortening of sentences by good conduct, corporeal punishment, &c. But there are other aspects of the measure in which we are vitally interested; for instance, the sufficiency and the quality of the prison diet, the warmth and cleanliness of prisoners' clothing, the question of solitary confinement, the character of the work assigned to prisoners, their opportunities for exercise, and the facilities for non-official visitation. Space forbids us, however, to discuss all these questions here at length. We can only refer shortly to one or two points that were prominently noticed in the debate in the House of Commons.

Sanitary Aspects of the Question: The Prison Dietary.

Some of the charges against the present system brought forward by Irish members (some of whom are, of course, tender on the subject) were obviously reckless and wild. Such, for example, may we consider Mr. T. P. O'Connor's declaration that it was "a system of deliberate, calculated, cruel, scientific starvation;" as also his further charge that sleeplessness was developed by the plank bed into a chronic disease. The Home Secretary had no difficulty in disposing of the first of these points, as there was no trace of it to be found either in the complaints of prisoners, or in the reports of the Royal Commission, or the Departmental Committee. It was absurd, he said, to speak of "scientific starvation," when it was ascertained that out of 180 prisoners discharged from convict prisons last year, no fewer than 97 had gained in weight on an average 7 lb. At the same time Sir Matthew Ridley was quite prepared to admit that there was some room for improvement in the prison diet, though the actual state of matters had been very much exaggerated. It was suggested that there might at least be some inquiry into the subject, if only to satisfy the public conscience.

Overcrowding Juvenile Prisoners, etc.

Mr. Asquith touched on a more substantial grievance when he spoke of the overcrowding of prisons, which was partly due to the excessive length of some of the sentences, and partly to the reluctance of magistrates to grant bail to prisoners on remand. This state of things, however, will largely be remedied by one of the clauses in the Bill. So, too, with regard to juvenile offenders, who should, if possible, be segregated. On both of these points Sir Matthew expressed himself as in entire accord with Mr. Asquith, adding that a good deal was already being done in this direction by the Department without legislation. The Home Secretary further indicated his desire to have prisoners employed in the open air, in such occupations as agriculture and gardening, though that is not always easy in the great centres of population. The aim of the Department, in short, is to humanise and ameliorate the conditions of prison life as far as possible. Great and sweeping changes in prison administration have been introduced in recent years, so that the charges which might not long since have been made against the system are no longer true; but the system is still full of defects which can be removed, and the object of the present Bill is to amend and consolidate the whole prison code, in the direction of establishing a more humane and healthy *régime*.

The Plague in India.

It is satisfactory to hear that the mortality from the plague in Bombay is steadily decreasing. Reuter's latest telegrams are exceedingly meagre in their information; no figures are given; but the broad statement is certainly reassuring. The immediate result of the improvement in the health of the city is a healthier tone in business. There are general indications of a revival of commercial activity. The receipts for the present month, as indicated in the returns of the Port Trust, show a marked increase as compared with April of last year, denoting a return to the normal conditions of trade. The receipts of railways connected with Bombay have also latterly shown a steady increase. We should like, however, to see fuller information about the death-rate.

TO OUR READERS.

The Editor solicits the co-operation of readers in making The Sanitary Record *more attractive by means of pen-and-ink sketches, photographs, and diagrams. There are many phases of sanitary work which lend themselves admirably to illustration. By this means not only individual articles, but the journal as a whole will be brightened.*

NOTES ON
PRACTICAL SANITARY SCIENCE.

By WILLIAM H. MAXWELL.

Assistant Engineer and Surveyor, Leyton Urban District Council, Author of "Drainage Work and Sanitary Fittings," "Ventilation Heating, and Lighting," &c., Certificates of the Association of Municipal and County Engineers, and Sanitary Institute.

No. 57.—REFUSE DESTRUCTORS.

(*Continued from page* 363.)

Mason's Refuse Gasifier.

Mason's patent continuous refuse gasifier is an apparatus of an entirely novel character for dealing with refuse. It is illustrated in section by the accompanying figure 28, and the following details of the system will be of interest:—

In this furnace, instead of burning the gases as they are distilled from the refuse, they are carried into a combustion chamber. Here they are mixed with the necessary amount of heated air to create combustion, with the result that a very high temperature is obtained which can be utilised for raising steam. It is claimed that "1 lb. of water can be evaporated for every pound of good refuse," and the heat obtained is about 1500 deg. Fah. The combustion of the gases being perfect, the nuisance of smoke, smell, dust, and partially burnt paper is obviated, as well as the cost of a fume cremator.

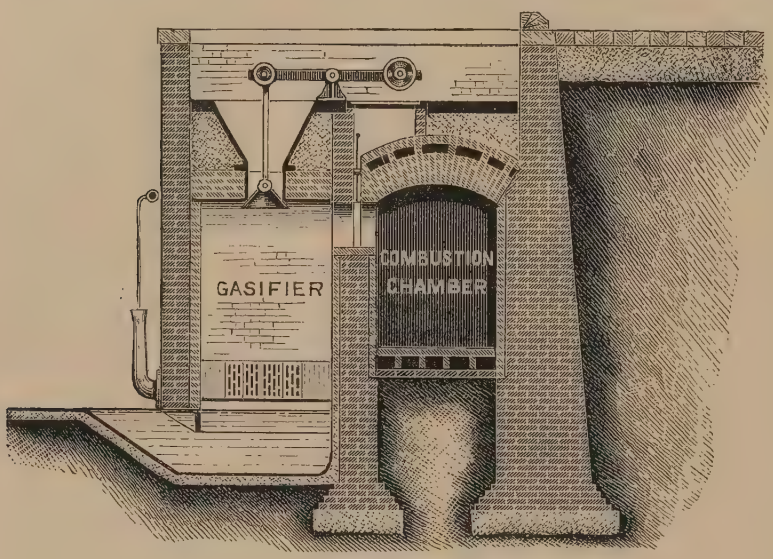


Fig. 28.—Mason's Refuse Gasifier.

The cells can be built either rectangular or cylindrical. At the base is a water trough, which covers the whole area of the cell, and into which the residue of the consumed refuse falls, from whence it is removed by means of a rake. The water trough also acts as a seal to prevent any gases escaping, and the vapour arising therefrom, together with the steam jet, prevents the grate bars from clinkering up. In the centre of the cell, immediately above the water trough, the grate bars are fixed in a sloping position. Near the top of the cell, on any side most convenient, there is an outlet for conveying the gases into the combustion chamber, and from thence into the flue of the chimney.

The total grate area is 12 square feet, and the manufacturers guarantee to destroy from 5 tons to 8 tons per cell per twenty-four hours.

The refuse is fed into the gasifier by means of a hopper at the top. It falls on to the grate already described, and, after combustion, slides into the water trough below, where it is cooled, ready for taking away. Steam and air are forced under the grate bars to create a draught, so that the cost of a high chimney is, it is claimed, thereby dispensed with. Where it is not intended to utilise the heat generated for steam raising, a small boiler will be necessary to supply steam for forcing the draught. No fuel of any kind is required, except when first lighting a cell. At the week-ends the cells can be banked up with refuse, and started again on Monday morning by merely turning on the steam.

The refuse is reduced to about 25 per cent. of its original bulk, varying, however, according to the percentage of combustible matter contained in it. The slow combustion that is taking place during the distillation of the gases from the refuse reduces the residue to ashes of a a suitable character for grinding for mortar making or for use as ballast for roads and footpaths.

As regards the labour required, the constructors state that two men are able to charge six cells and attend to the proper working of them. The total cost of construction, including royalty, may be taken roughly at £200 per cell; this is exclusive of any other work outside the cells proper. Owing to the comparatively low temperature at which the cells are worked, the cost of repairs is said to be small. This system is in use in the district of the Moss Side Urban District Council, near Manchester, where it may be observed that there is no smoke or smell emitted, although the chimney is only 25ft. high. The refuse consists of ashpit refuse, fish offal, and slaughter-house residue.

The patentees and constructors of this Refuse Gasifier are Messrs. W. F. Mason, Limited, engineers, Longsight, Manchester.

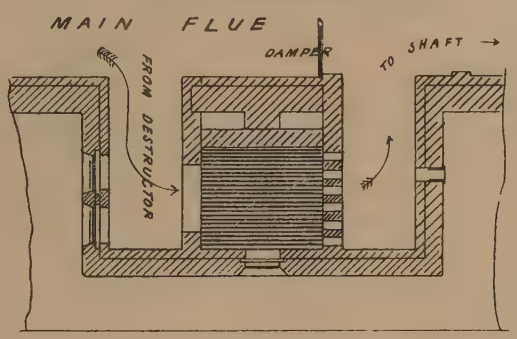
DESTRUCTOR ACCESSORIES.

Jones' Patent Fume Cremator.—This contrivance has been the refuge of many of the earlier destructors, which, being incapable of "consuming their own smoke," have stood seriously in need of some such remedy, inasmuch as public nuisances and legal difficulties have arisen almost simultaneously with their erection. Hence it is that we find the "cremator" forming an essential part of a large proportion of the older destructor installations at the present time.

Not long after the erection of the first destructor in the vicinity of the metropolis, viz., that at Ealing in 1883, complaints of nuisance arose. The vapours given off in the drying of the refuse whilst undergoing its first stage of burning, were very perceptible, and formed cause for complaint; as also did the escape of fine dust, &c., from the chimney shaft. The fact of the existence of a nuisance, it was found, could not be ignored; and, after some consideration, it was concluded that the nature of the furnace was such that the difficulty was only to be overcome by the construction of an *absolutely independent furnace*. This difficulty gave birth to the "fume cremator" in 1885. It was designed by Mr. C. Jones, M.I.C.E., Engineer and Surveyor to the Ealing District Council, who patented the arrangement for the purpose of cremating and rendering harmless the objectionable fumes, known as the empyreumatic vapours, which arise during the earlier stages of the process of burning towns' refuse.

The accompanying figures 29 and 30 show the construction of the furnace, and it will therefore be

Fig. 29.—Plan of Jones' Fume Cremator.



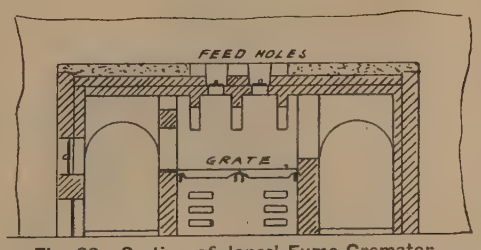


Fig. 30.—Section of Jones' Fume Cremator.

unnecessary to give a detailed verbal description. Briefly, the "cremator" consists of a reverberatory arch, with rings of fire-brick placed in the direction of the gases. Ribs of fire-bricks projecting from the arch serve to deflect the gases, and direct them on to the top of a red-hot mass of fire. A heat, varying from 1000 deg. to 1500 deg. Fah., is maintained at a small expense of fuel, fine coke-breeze alone, or with the ashes screened from the refuse, being all that is required, together with a supply of air beneath the fire-bars, and a further supply to feed the vapours as they pass into the cremator.[139]

The furnace has from time to time been very favourably reported on by many of those having experience in its use, and also by scientific experts employed to examine as to its utility, but any such appliance obviously betrays the destructor to which it is attached.

The fuel used in the cremator is either coke breeze, coke breeze and screened ashes, screened ashes alone, or small coke. The cost of cremating the fumes per ton of refuse destroyed varies from ¼d. per ton, where only cinders are used, to 3¼d. per ton. At Batley, where coke is used, the cost is given at 7d. per ton, and at Nelson, where the destructor was of the "Beehive" type, 3s.

In the discussion which followed the reading of a paper at the Sanitary Institute on "House Dust Refuse," by Mr. J. Russell, in February, 1892, it was stated that with regard to the destructor at Hornsey a *fume cremator* had been added to it, but that it had not been found necessary to use it so long as the firing of the furnace was carefully attended to. The chimney of the destructor was 217ft. high. The cost of using the *cremator* came to about £800 a year,[140] as it was found necessary to use coke for firing. The use of coke breeze had been tried, but caused large volumes of smoke.

Speaking generally of cremators, the following observations[141] of Dr. Stevenson Macadam, Ph.D., F.I.C, &c., appear to be very much to the point. He says: "The difficulties connected with destructors in general for the thorough combustion of the refuse and the escaping gases into innocuous matters, arise mainly from the varying conditions of any single cell from time to time, so that, even when it is possible to get up the proper temperature when the cell is in full blast and in the cindering and clinkering stage, yet, when the charging operations are proceeding, and for some little time thereafter, the temperature becomes lowered below what is required for efficient treatment of the refuse and its products. To overcome the deficiencies, recourse has been had to the use of *cremators*, which practically form part of the main flue, and where a bed of red-hot coke or other fuel is supposed to be constantly burning, and over which the smelling gases must pass and ought to be consumed. The suggestion and construction of these cremators is an admission of the inefficiency of the destructor proper, and are *a mere whitewashing of an imperfect machine*.

"The cremators are costly in working, are not properly attended to, and though I have repeatedly looked at them during my inspection of the destructors, and have even been told beforehand that they were in operation, I have never yet found one of them in actual full work, though otherwise they were in serviceable condition.

"A *cremator* should not be called upon to check or rectify the imperfections of any destructor, and the destructor proper should be capable of doing its own work."

The "Carboniser." — The "Carboniser" was invented by Mr. Fryer for the purpose of converting vegetable refuse into charcoal, but it has not proved a success. It was erected at Leeds, Birmingham, Warrington, and Derby; at which last-named town alone is the furnace still in use, and there only to a very limited extent.

Mr. Codrington gives the following description of the carboniser at Derby:—

It consists of a group of four cells of brickwork,

139 Mr. C. Jones' "Refuse Destructors" (1894).

140 "Transactions" of the Sanitary Institute, vol. xiii., page 57

141 *Journal* of the Society of Chemical Industry, 31st March 1896.

each 2ft. by 3ft. 6in., and 13ft. high, with a vertical flue in the middle, and a furnace alongside each cell at the bottom. Within the cells a series of cast iron plates are fixed with their upper edges touching the walls, and their lower edges standing away, forming a continuous sloping ledge winding round the cell from the top to near the bottom, where they terminate in a fire-brick chamber having a sliding door in the bottom.

The refuse is fed in at the top, and is not mobile enough to rise behind the plates, so that a spiral flue is left for the passage of the hot gases from the furnace at the bottom to an opening into the vertical flue at the top and downwards to the chimney.

The refuse dries and sinks coming into contact with hotter plates as it descends until it reaches the red-hot fire-brick chamber. *No air reaches the refuse except through the furnace, and it is therefore charred and not burned.*

At intervals the sliding door in the bottom is opened, and a charge of charcoal is withdrawn. Each cell carbonises about two tons of refuse in twenty-four hours. The furnace burns cinders selected from the ashpit contents. The charcoal is cooled in a revolving cylinder on which a stream of water flows, and is sifted through a screen at the end in a fine powder.

At Derby the carboniser cost £1000; it was worked about two days a week at a cost of £18 per year, and produced about 20 tons of charcoal a year, a ton of vegetable refuse, sawdust, &c., yielding a hundredweight of charcoal, which was used for deodorising, and valued at £5 per ton. This apparatus is now being pulled down for space to erect more destructor cells.

At Leeds no use or market was found for the charcoal, and analysis proved it to contain 80 per cent of earth.

Furnace for recovery of tin and solder from old cans.—A small furnace for the recovery of tin and solder from old cans has been introduced by Messrs. Manlove, Alliott, & Co., Limited, The solder tins are collected in hampers or other handy receptacles and tipped directly into the oven. In the course of three or four minutes the solder will be seen running out in a stream through the small aperture and shoot, which lead it into the collecting receiver. When the attendant is satisfied that the whole of the solder has been recovered or run down into the receiver, he moves a handle, which causes the tins to fall on to the lower set of bars, where they are raised to a red heat, and the tin completely burnt off.

The whole process as a rule occupies little more than an hour, and it is found in practice that it may be repeated eight times per day. The fuel is placed on a set of fire-bars near the bottom of the oven, and usually consists of refuse material, such as waste paper, cardboard, hampers, &c., which comes in with the ordinary house and town refuse.

The furnace performs two operations: one, the melting off and collecting of the solder, and the other burning the tin off the iron so as to leave "scrap" of a marketable character. Both processes are carried on at the same time. The economical value of the invention may be gathered from the fact that the solder may be disposed of at prices varying from 5d. to 8d. per pound, and is usually about two-thirds the market value of tin.

THE SANITATION OF DOMESTIC BUILDINGS.

By Frank Latham, C.E., M. San. Inst., &c., Assistant Surveyor, Borough of Margate.

CHAPTER VI.

Section 5.

BATHS AND LAVATORY BASINS.

An essential and important factor in assuring and maintaining good health is personal cleanliness, which to every individual should be a habit of life. The neglect of the natural law by which the waste substances of the body are removed through the

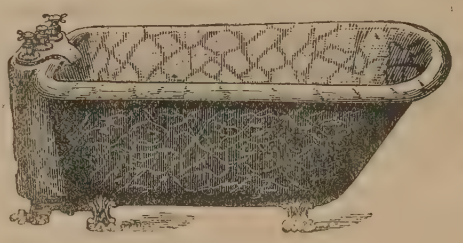


Fig. 81.

pores of the skin is that the perspiration instead of being freely removed is unduly thrown back on to the lungs and other organs, the result being that the system is lowered and rendered more liable to disease. It is therefore highly desirable that facilities for frequent ablutions should be provided in the dwelling-house. The excuse of want of room is hardly sufficient for its absence. The writer has seen in houses where the space has been exceedingly limited, baths conveniently fitted and

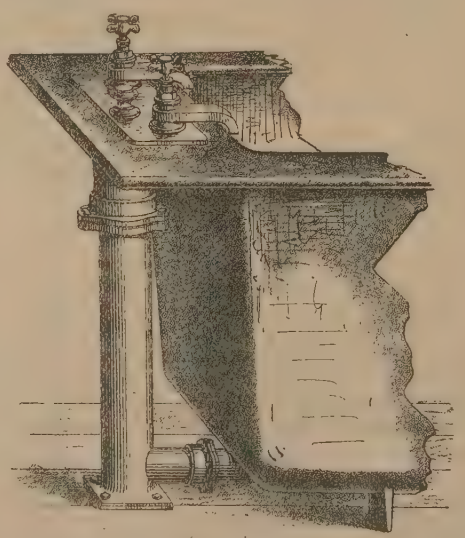


Fig. 82.

framed with a mattress on the cover, thus serving a double duty as bed and bath.

The variety of baths now on the market are too numerous for their merits or demerits to be enlarged upon in the present article, but the following brief descriptions will give a fairly general idea of them. Cast iron baths enamelled internally with roll edges and ornamental feet are simple in

construction and of good appearance (Fig. 81). These baths do not require framing in. Some persons prefer a wooden to the roll iron edge as not striking so cold. These baths can be obtained with flanges arranged for an edging of woodwork being fitted to them. Copper baths are to be recommended in preference to iron, where they are much used, such as in hotels, schools, &c., as the latter under such circumstances, owing to the expansion and contraction, are liable to crack and become useless.

Some of the most cleanly baths manufactured, and particularly suitable for hospitals and public baths, &c., are constructed of thick earthenware glazed inside and outside, thus needing no framing in. This description of bath has a very inviting look in hot weather, whilst in the winter, when once warmed retains heat for a considerable time. Wood-framed and lead-lined baths are now obsolete. Zinc baths are cheap, but not to be recommended.

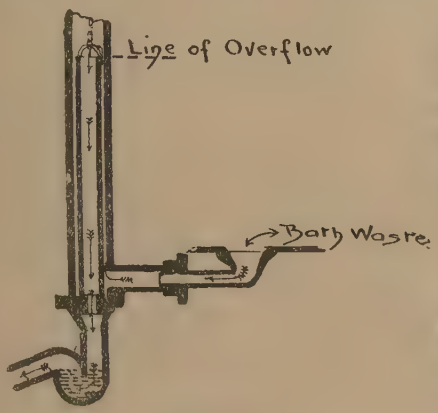


Fig. 83.

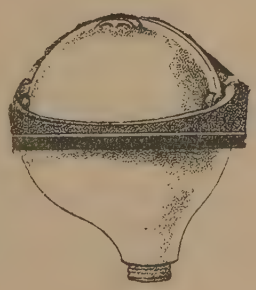


Fig. 84.

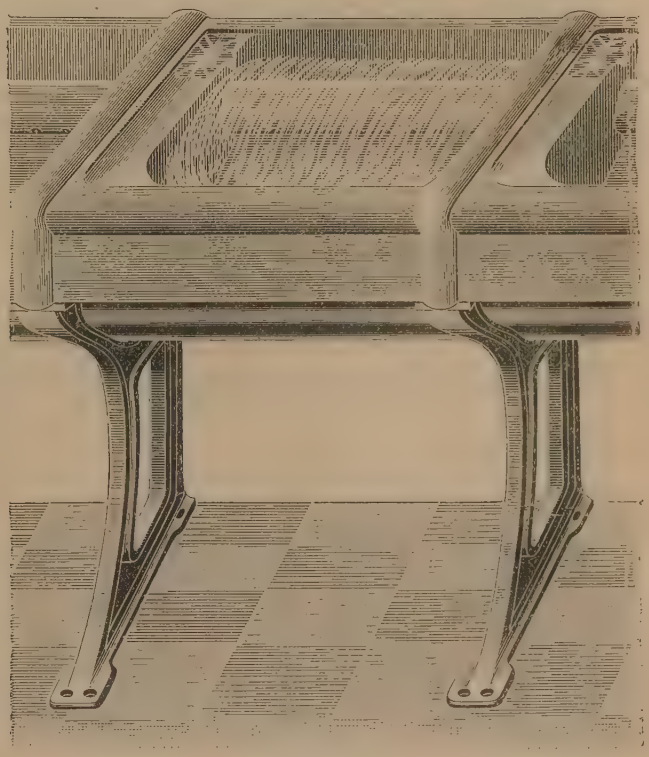


Fig. 85.

All baths should be fixed against an external wall, and, as mentioned in Chapter IV. respecting sinks, the waste pipe should be properly trapped immediately beneath the apparatus, the pipe being arranged to discharge in the open air, either over a gully channel or connected with a special bath waste pipe carried up with an open end as a ventilator, and discharging under a gully trap grating at the foot. Overflow pipes should always be fixed and connected to the bath waste pipe at the house side of the trap (Figs. 82 and 83).

When there is more than one connection a ventilation pipe must be carried off the waste pipes to prevent syphonage, such ventilator to be terminated in the open air a short distance up the wall. The baths should also be provided with lead safes somewhat wider than the baths, with the usual waste pipe, its end being covered with a proper flap valve. The waste pipes from lavatory basins, also, should be treated in precisely a similar manner as those of baths.

Some of the forms of lavatory basins are as follows:—The plug basin is simply a glazed earthenware basin fitted with a plug and chain, having also provision at the side to prevent overflow; these basins being inexpensive and lasting, are extensively used. The flushing rim basin is similar to the above as regards the plug, &c., but, in addition, is supplied with water through a flushing rim, so that the whole surface of the basin is well cleansed each time the water is turned on. The tip-up basins for lavatories are oval in shape, suspended in receivers (Fig. 84). They are clean and simple in action, being especially adapted for clubs, hotels, and public lavatories. Twyford's "Rivulet" lavatory basins (Fig. 85) are supplied with a continuous flow of water, and designed for use in schools to obviate the possibility of a number of children washing in the same water, dirty water being carried away over a weir at the back of the basin into a waste pipe, whilst all sediment is removed into the same pipe through an outlet in the bottom of the basin.

Lavatory basins should be fitted in a slate or marble top, supported by iron brackets or standards, such top having a small bead at the edges to prevent splash water from running over on to the floor.

(To be continued.)

"PRACTICAL SMOKE PREVENTION."

By W. Nicholson, Smoke Inspector, Sheffield.

(*Continued from page* 392.)

Insufficiency of boiler power.—This is another cause of black smoke. Many people are very sceptical on this subject, and say they don't believe that manufacturers would put down a boiler too small for the work they desire to do; they would consult an engineer, and know exactly the size of boiler required, and put such a one in. Yes, that is perfectly true, they do; but seldom in their calculations do they consider the development of their business, the probable additional power required, and order the boiler accordingly. No, they order for the present, and afterwards keep adding machine after machine, until they find the boiler is too small for the work they desire to do. Many manufacturers are so situated. Many difficulties confront them when called upon by the Press or Public Authority to provide more boiler room; it is much easier said than done. (1) The cost, say, at least £300, which means a great outlay to small struggling tradesmen; (2) shortness of room; and (3) their trade is such they cannot afford to lose the time necessary for the alterations without largely losing their trade, which would mean ruin to many of them. It is necessary when talking about providing more boiler room to consider the difficulties manufacturers have to deal with, and treat them accordingly. We cannot lose sight of the fact that shortness of boiler room is another of the great causes of black smoke. We may ask ourselves, In what way? (1) The fires have to be unduly forced in order to generate steam quickly enough to meet their requirements, the fireman is constantly throwing on green coal, and knocking his fires about to try and get from the boiler more than its maximum power. With what result? Extra labour for the fireman, coal wasted, and dense volumes of black smoke emitted. The only remedy when under such conditions is a bigger boiler. It is only fair to state (and it has been proved many times) that with careful firing, which means firing lightly and often, much smoke can be prevented, and the maximum power got from the boiler, but some of the firemen when pushed for steam, by the shouting of the men in the forge or mill, at once lose their heads, begin to knock their fires about, mixing the clinkers amongst the coal, and thus generating less steam than they otherwise would do if they fired with care in the ordinary way.

By briefly looking at the above five things, which are mainly or wholly the cause of producing black smoke, we cannot help but be convinced of the enormity of the cost. (1) Financial, waste of coal; (2) public health—disease caused by dirt; and (3) the moral cost, which is often forgotten. Many of the poorer people are compelled to live in districts where they are at times almost enveloped in smoke. The dirt they cannot dispose of; hence in time, being surrounded and living in it they become dirty in habit, dirty in morals, and debased to an incalculable degree, and in the end public morals are affected as a consequence. Having pointed out the cause of black smoke, we are now confronted with the question,

CAN IT BE CURED OR PREVENTED?

To such a question we say "Yes" at once. A manufacturer was prosecuted for emitting black smoke. Evidence was given, and the nuisance proved to the satisfaction of the Court. The stipendiary asked the defendant if he could abate the nuisance in one month, if he made an order to that effect. The defendant said in reply, "he could completely abate it in fourteen days and would do so." This answer somewhat surprised the stipendiary, who asked how he would do it. The defendant, replying, said, "he should go back to the works, give all the men notice, set down the furnaces, and shut up the shop, then there would be no nuisance to complain about." That was one way to prevent a nuisance, but not a very practical way, because the cure in many ways would be worse than the disease. Some may think by the citing of the above instance that nothing ought to be done to compel manufacturers to take practical steps to prevent black smoke nuisances. Nothing of the kind; I am only pointing out how much easier it is to prevent smoke than to practically consume it. There are those who say that very little has been done in the past—say, twenty years—to put an end to this intolerable smoke nuisance; to such I would say (with all kindness) that they know nothing at all about the question. If they were manufacturers they would sing a different song, especially if they were situated in Sheffield. They no doubt base their conclusion on the number of prosecutions taken. If so, they have not the slightest conception of what has been spent in every kind of so-called smoke consumer. I could give scores of cases where hundreds of pounds have been spent on appliances, simply through the service of a notice to abate. Let me state one. A chimney emitted a few minutes of black smoke in an hour; the boilers which discharged into this chimney were fitted with the most modern mechanical stokers (nearly new), and on the receipt of the notice the engineer received instructions to take the stokers off and put on another kind of appliance, which was at the time being recommended as a smoke preventer. This firm, through the serving of the notice, spent at the very least £500, and on other boilers subsequently spent twice that amount to prevent, if possible, a nuisance on their premises. This is only one instance of many that I could give of firms having spent in some instances £2000 in all kinds of appliances to try to prevent it. They have not appeared in Court, because they have done all they can, spent most liberally and ungrudgingly on anything and everything which they were told would do away with smoke. If the public only knew what had been spent to put an end to the smoke nuisance, the amount would simply startle them, and cause them to consider a little before they said nothing had been done.

What has been done in the way of experiment, invention, and investigation, say, during the last ten years?

The active agitation on this question sets the minds of men in motion to try and devise various kinds of appliances to consume smoke. The inventive faculty soon filled the market with all kinds of mechanisms, costly and complex, each owner claiming perfection for his patent. All these have been tried in their time (and they are

almost numberless), with one invariable result, viz., failure to abate the nuisance. What has, and is being tried at the present time, to prevent black smoke? To mention separately the number of smoke consumers placed upon the market would fill a book, which would hardly be worth the time wading through, because their name is legion. Some have lived, or, we might more truthfully say, have had a struggling existence for a few years, and then succumbed to the severities of the world. The majority of them have passed away very quickly after their birth, to be remembered only by the patentees, who have found them to be very costly children.

It will be well to notice the various kinds of patents before the public which have been tried for years, and are being used at the present time, with the object of preventing black smoke, and such an inquiry, we think, should convince all men that much is being done, and money spent to prevent smoke. For our purpose in this paper we may classify them under ten heads, viz.:—(1) Grids or circulars on the doors; (2) hollow bridges or split bridges; (3) hollow bars of various shapes; (4) mechanical stokers, sprinkling, and coking; (5) smoke-washing apparatuses; (6) smoke-condensing apparatuses; (7) steam jets in the furnace; (8) fuel economisers and smoke preventers; (9) forced draughts of various kinds; (10) automatic panel or lower doors.

Let us look shortly at the above-named appliances, and see how far they have proved satisfactory as smoke preventers.

GRIDS,

or circulars on the doors for admitting air to the furnace, have been deemed necessary the whole of this century, and even to-day on all new boilers the grids are to be found, proving conclusively that air is required in the furnace after firing to ignite the gases. These grids have to be opened and shut by hand as required by the firings, and if worked regularly, opened and closed at the proper time, they will prevent black smoke, if the openings are sufficiently large to admit the proper quantity of air, and the fireman fires as he ought. Many have kept to the old grids, and say, "Though it is an antiquated idea it is a good one, and nothing better if they would only work themselves," for they find sometimes the men forget, or will not work them.

The hollow bridges have had an existence, so we are told, since 1812. Some know them as split, or double bridges. They are built of metal, or brickwork, situated at the far end of the fire-bars, underneath. There is a door to which is attached a rod to open and close it. The air is admitted through the door and bridge into the tube and ignites the gases. Many are in use at the present time, but many have discontinued using them, because they destroy the draught in the furnaces by pulling the air under the bars instead of through the fire. They also state they require a lot of attention, as they are quickly filled up with ashes. This method of admitting air does cut off the smoke if attended to.

Then there are hollow bars of various kinds, which take air through them and admit it at the same point in the tubes as the hollow bridge. The air is continually going into the tubes when not necessary, in many instances 80 per cent. more than required, and because of this, and burning away quickly, they have never become very popular, although some are used at the present time.

MECHANICAL STOKERS.

There are two kinds, known as the coker and the sprinkler. The coker deposits the fuel in the front of the fire, and then works it forward. The sprinklers by a small shovel throw a little on the fire at once, distributing it over the grate bars. There are many makers of stokers, the mechanism of each varying somewhat, but in principle there is a sort of similarity. At one time many more stokers were used than at the present time. They work fairly well where regularity of power and running is required, say, for cotton and flour mills, and other similar classes of work, but where the power and running required is very irregular, they are of very little use, as they need so much attention, and because of this many large firms have abandoned them. They are very expensive, the cost of working, repairs, &c., are very heavy, and some say, who have worked them for years, that there is no saving in firemen, as the men are constantly called upon to assist them by hand.

SMOKE-WASHING APPARATUS.

This kind of apparatus has been tried in various forms; the idea being to wash the smoke after leaving the furnace, and take from it all its blackness, emitting into the atmosphere nothing but an invisible vapour. The smoke was met by sprays of water, and fan-worked beaters, which were supposed to wash out the blackness, the solids to be used for some purpose, while the fan also provided the necessary draught. This was a most expensive process, and proved impracticable, and the company which placed it on the market dissolved. Then there came after this what was called a "smoke condenser," which proved to be a very crude and unpractical idea. It consisted of large tubes, almost as big as a boiler, three in number. The chimney was dispensed with, the smoke from the boilers discharged into these tubes, No. 1 first, then No. 2, and afterwards into No. 3; then out into the atmosphere. In each of these tubes were steam jets, which met the smoke, and were supposed to condense it, the solids going into receivers, and sold for disinfectant, which the patentee claimed to be of more value than the cost of the coal. This looked well on paper, but came out badly in practice. It did destroy the smoke, but also destroyed the draught, the furnace fires almost went out, and the patent as a natural consequence went quickly out of existence.

STEAM JETS.

Steam jets are put into the boiler fumer, and other kinds of furnaces, for two purposes, (1) to force the fires, and (2) to kill the smoke. Steam to force the fires has been used for many years, especially by those whose chimneys were low, and whose draught was bad. For this purpose they have given great satisfaction. To blow the steam on the fire is admitted by many to be the proper place to apply it for increasing the evaporative power of the boiler and jet at the same time. It is a very simple arrangement, very cheap, nothing to get out of order, and if worked continuously under most conditions (both in boilers and in heating furnaces), it proves very efficient. Though

abandoned by many for a number of years, manufacturers and engineers have come to the conclusion that for a forced draught there is nothing to beat it, and they are again applying it to their boilers.

FUEL ECONOMISERS AND SMOKE PREVENTERS.

Apparatuses known by these names vary somewhat in principle and construction. Some admit air automatically at the door, and bridge also. There are levers to lift by the fireman before he is able to fire, and this the men do not like; so it is easy to conceive they have not gained much favour with the men. This kind of apparatus has been adopted very largely, and if kept in order it works fairly well. They prevent smoke, but have a tendency to cripple the draught, as the pull is divided between the door and the bridge. These machines would have had a much longer life if the men had taken to them; but entailing a little labour, workmen went dead against them, and were largely responsible for their not becoming more general in use.

FORCED DRAUGHTS.

During the last few years manufacturers have had a craze for *forced draught*. The cause of it can be attributed to patentees who have trotted out various kinds of appliances, and many people have put on a *forced draught* when their natural draught has been quite sufficient for all practical purposes, but they have been led away by the delusion that 25 per cent. could be saved by burning all sorts of rubbish. They have found out their folly afterwards, and many have returned to the natural draught again.

There are many *forced draughts* in the market to-day, each differing slightly in detail, but in principle they are practically one. How is the force applied? Nearly all of them box up the ashpit, apply from one to three steam jets under the bars, which blow the steam through the bars; some one jet through bars, one through a split bridge; others have a door in the dead plate to admit air and steam to the furnace; while others have also jets on the top of the fire. Some have dispensed with the ordinary fire-bars, and made a special bar, while others have done away with bars altogether, substituting a thick plate on which the fire rests. The steam being blown into the fire generates the heat. Some have also made special doors with holes in of various sizes to continually admit *air* with the steam. As we have already stated, there are slight differences in detail, but there is a sameness or oneness about all of them. These kind of appliances are very largely used at the present time. They are very costly, not automatic, hence their working entirely depends on the men who have to shut off the steam before firing, and turn it on afterwards.

The chief claim for this kind of apparatus is economy, by being able to burn an inferior fuel. There is much difference of opinion on this point. Some who have had them working for a length of time say, "There is a slight saving, considering all things;" while, on the other hand, others say, "There is no saving, but a loss, when the extra quantity of coal consumed is considered, extra flue cleaning, extra carting of refuse, burning away of the various parts of the apparatus, and burning of bars," and in some instances they add the "burning of the boilers." When totalled up they say the loss is considerable; and many who have spent hundreds of pounds on them, have just recently decided to go back to the natural draught, which, they say, is far more economical and in every way more efficient. Let us just look at them for a moment or two from a smoke-preventing point of view. Will they prevent black smoke? To such a question our great experience amongst them warrants us in saying, "Yes," but we would also state that it is absolutely necessary to use very great and constant care in firing in order to do so. We might truthfully say, often the man and not the machine is responsible for preventing smoke, and is thus entitled to the credit. Many users of them admit their great liability to make black smoke, and attribute it to the ashpit being boxed up, which many contend is wrong in principle. But let one with long and varied experience among all kinds of boilers speak for himself. A large firm of boiler makers in England have a patent forced draught like those spoken of, viz., two jets under the bars and in the fire. This arrangement has been working for a long time with fairly satisfactory results. When questioned as to the position of the jets, and their merits, they said, "The two jets under the bars were practically of no use, unless it was to make smoke." The jet in the furnace, they said, "was doing all the work, forcing the fires, and preventing smoke;" and when asked why they boxed up the ashpit, and put two jets under the bars, they replied, "Because the people liked them boxed up, believing by so doing they derived great benefit by economy and prevention of smoke." Such statements from experienced persons point out very clearly the value or otherwise of such methods.

As we have already stated, with care smoke can be prevented by the various kinds of forced draught, but sometimes firemen will not use exceptional care. They say, "if it is a smoke burner it ought to burn the smoke, when they carry out the working instructions, but they don't prevent it sometimes." After very bad emission of smoke from boilers which had attached to them forced draught, I have gone into the works and questioned the firemen, who said they "had worked the jets as they were instructed, yet black smoke belched forth." No doubt they will think it almost incredible when I state that frequently boilers with forced draught have emitted in one hour from four to forty minutes of black smoke, and I may say further, as a fact, the boiler with a forced draught has emitted forty-five minutes of black smoke in one hour, and the fireman swore "he had worked the jets according to the instructions." If necessary, I could quote lots of cases where the chimneys were fairly good prior to the adoption of forced draught; now they are making much more smoke, and have had to pay the penalty. What is the explanation? The boilers are the same, the work on them is the same, the men are the same, they are as careful as before, and the conditions of working in every way are the same; yet they are making more smoke since they dispensed with natural draught. I will not express an opinion, but have given the reader some facts from which he will be able to formulate the correct answer. Then there is also what is known as

PANEL, LOUVRE, OR VENETIAN STOVES,

which open and close automatically, and can be

regulated to admit the desired quantity of air to the furnace. These are very simple arrangements, easily applied to all kinds of boilers and furnaces; nothing to get out of order, and with ordinary care in firing, they work fairly well and prevent black smoke. This is a coming back to the old idea of grids, which are worked automatically, and not dependent on the fireman.

A YEAR'S PROGRESS IN SANITARY SCIENCE.*

By JOSEPH PRIESTLEY, B.A., M.D., D.P.H., &c.

(Continued from page 395.)

DIPHTHERIA STATISTICS.

Diphtheria increases steadily, and no satisfactory explanation (beyond the influence of schools) is yet forthcoming. The importance, however, of the antitoxin treatment is shown in a valuable (second) report, signed by eight (out of nine) medical superintendents of the various hospitals of the Metropolitan Asylums Board,† and published during the year, giving an account of the use of antitoxin serum in the treatment of diphtheria during 1896 (*vide* also "Medical Annual," 1897, p. 624). Of the total cases, 71·3 per cent. have been treated with antitoxin with the following results, to which are added, for comparison, the cases treated in 1895 (also partly with antitoxin), and those in 1894 (without antitoxin) :—

Day of Disease on which Treatment was commenced.	Mortalities per centum. 1896		1895		1894
	All cases.	Antitoxin cases.	All cases.	Antitoxin cases.	All cases. No antitoxin.
First day	4·7	5·2	11·7	4·6	22·5
Second day	12·8	15·0	12·5	14·8	27·0
Third day	17·7	21·9	22·0	26·2	29·4
Fourth day	22·5	27·8	25·1	33·1	31·6
Fifth and after ...	24·6	31·7	27·1	35·7	30·8
Total	20·8	25·9	22·5	28·1	29·6
Tracheotomy cases	41·0	40·6	—	—	70·4
Laryngeal cases ...	29·6	28·8	—	—	62·0
Post-scarlatinal diphtheria	5·0	5·9	—	—	—

Of the total cases (antitoxin and others), the percentage mortalities may be further sub-divided as follows :—

	1896‡	1895‡	1894
Under five years of age	30·2	34·2	47·4
Between five and twenty years of age	15·2	15·8	20·5
Twenty years and over	8·9	2·5	6·5

* Abstract of article contributed to the *Medical Annual*, 1898.

† Two thousand seven hundred and sixty-four cases were treated with antitoxin during 1896, and Dr. Gayton, of the North-Western Hospital, is the only superintendent who does not sign the report.

‡ Taking only antitoxin-treated cases, the figures are: Under five years of age, 1896, 32·2; 1895, 37·4. Between five and twenty years of age, 1896, 20·8; 1895, 21·3. Twenty years and over, 1896, 4·2; 1895, 3·9.

As to complications, there is an increase in their numbers for 1896 as compared with 1895—such increase being more apparent than real, and due to the fact that the statistics for 1896 are more exact than those of 1895, whilst with the lessened mortality, or even the mere prolongation of life, *cæteris paribus*, an increase in complications was to be expected, *i.e.*, more time is allowed for such complications to be developed.

Complications (all cases)*	1896	1894
Albuminuria	53·4	24·1
Nephritis	0·5	1·2
Paralysis (various)	21·3	13·2
Pneumonia (lobar)	0·5	0·3
Pneumonia (lobular)	2·5	1·6
Relapse	1·6	0·9

A rash in connection with the antitoxin treatment was found in 35·2 per cent., and was generally of an urticarial, erythematous, or scarlatinal type; whilst joint pains were noticed in 6·5 per cent., abscesses at seat of puncture in 1·2 per cent., and pyrexia (with or without rash or pain) in 19·8 per cent. of the cases.

ANTHRAX.

Another important report published during 1897 is that of the Anthrax Committee, who have come to the following conclusions :—

(1) Anthrax is a disease which attacks man and several of the lower animals (*e.g.*, horse, cow, sheep, goat), and is transmitted by inoculation, or by breathing and swallowing—the former known as external anthrax or malignant pustule, the latter as internal anthrax—from wool (including camel hair and goat hair), hides and skins, horse hair, and bristles.

(2) The incubation period is short—not over three days.

(3) Theoretical preventive measures consist of (*a*) exclusion of infected material from use; (*b*) disinfection; and (*c*) employment of insusceptible persons, but are practically impossible to carry out.

(4) Practical preventive measures are suggested as follows :—(*a*) Employment of persons with requisite experience; (*b*) exclusion of workers with the slightest open sores; (*c*) treatment of suspected materials by washing or disinfecting; (*d*) special ventilating precautions, *e.g.*, dust removal, adequate air space, &c.; (*e*) cleanliness of rooms, persons, and clothing.

LEPROSY.

The International Conference on Leprosy at Berlin have reported during the past year that the leprosy disease is due to the entrance into the blood of the bacilli lepræ of Hansen and Neisser. The disease exists only in man, is contagious (and not a hereditary disease), and therefore the sufferers require to be carefully isolated—compulsory isolation following notification, and careful medical inspection. Considering the scientific standing of the members and experts of this Commission their conclusions are noteworthy, and settle once and for all the life history of the disease and the means at our disposal for combating its extension.

PLAGUE.

The International Sanitary Conference, or Convention, at Venice, has also reported during the year to the following effect :—

(1) The necessity for inter-governmental notifica-

tion (by telegraph) of plague, with account of the progress of the disease, prophylactic measures adopted (inspection, isolation, disinfection, &c.), together with detailed statement of action taken (permissive) as to exportation of susceptible articles, *e.g.*, rags, body linen, clothes, and bedding, used sacks, carpets, embroidery, skins (raw fresh, untanned), animal *débris*, human hair, &c.

(2) The importance of a *daily* medical visit of all persons on board vessels leaving infected ports outside Europe with efficient disinfection of articles on board, &c., and power of keeping back any person or persons suspected of sickening for the plague.

(3) Special details as to pilgrim ships, with a particular code of rules as to pilgrimages both to the Hedjaz and up the Persian Gulf (before and during the voyage), with suggestions of necessary improvements at the various sanitary stations to which pilgrims have to go in the Red Sea.

(4) Special regulations as to terrestrial frontiers, the Red Sea, and sea routes generally.

(5) Special measures to be adopted when plague breaks out in Europe, whether by land or sea, *e.g.*, (*a*) inter-notification as to the disease, and measures of prevention taken; (*b*) particular measures to be taken in connection with infected, suspected, and healthy vessels respectively at various ports of arrival.

The incubation of plague is limited to ten days, and frontier restrictions as to quarantine, &c., are left to the various countries, States, &c., concerned.

Notification, medical inspection, and disinfection (together with improved sanitation generally) are the keynotes to the labours of the Venice Convention, and in this connection the 1897 Milroy Lectures of Dr. Collingridge (sounding the death-knell of the old quarantine) are interesting. In these Lectures the life history of quarantine is told, its legislative aspects described, and its final death related; whilst a full account is given of the means of defence against disease importation now in the hands of all Port Sanitary Authorities and their Medical Officers of Health, viz., notification, medical inspection, disinfection, and sanitation—results which are practically the outcome of various Conferences amongst the representatives of different nations, *e.g.*, Vienna, 1874; Rome, 1885; Vienna, 1892; Dresden, 1893; Paris, 1894; Venice, 1897.

VACCINATION.

No action has yet been taken by the Government to give effect to the recommendations offered in the report of the Royal Commission on Vaccination (*vide* "Medical Annual," 1897, pages 618, 619), though Sir T. Thorne and Dr. Copeman, after visiting the continental vaccine centres, have reported favourably on glycerinated (not vaselinated or lanolinated) calf vaccine lymph, and recommend that it be distributed from the National British Vaccine establishments in air-tight glass receptacles. The general adoption of calf lymph and the abolition of the arm-to-arm vaccination (except amongst members of the same family) would be an important step in the right direction, and go far to lessen the opposition of a large section of the anti-vaccinators. The same may be said as to re-vaccination, which is equally as important, as shown by the evidence submitted to the Royal Commission, who, however, whilst stating their belief in the value of primary vaccination, make no recommendation as to legislation in regard to re-vaccination—an anomalous state of affairs pointed out during the year by the Epidemiological Society of London in the form of a special resolution carried unanimously at their meeting.

Vaccinators and anti-vaccinators are prepared for action when the subject of vaccination comes before the Houses of Parliament (if it ever does), but it is doubtful what the result will be.

TYPHOID FEVER AND WATER ANALYSIS.

Serious epidemics and outbreaks of typhoid fever at Maidstone, Lynn, Clifton, and Belfast, have drawn great attention to water supplies and to the care needed to safeguard them from pollution. Prevention is always better than cure, and if the epidemic scourges of the past year give rise to improved water supplies, not only in the towns concerned, but also amongst Sanitary Authorities generally, they will prove to be real blessings. That the water supplies used by certain Sanitary Authorities are far from satisfactory goes without saying, and the difficulties that arise from water supplies being in some cases in the hands of private companies (who seem to have an objection to interference in the way of inspection, &c., by the officers of a Sanitary Authority) appear to be well-nigh insurmountable. The Stockport Corporation, as a Sanitary Authority, is suggesting petitioning Parliament for compulsory powers of inspection and examination of water supplies by their officers, and such powers might with advantage be granted to all Sanitary Authorities. It remains, however, to be seen what view Parliament will take of the subject. The relative values of chemical and bacteriological analyses of water have naturally been also much discussed during the year, with the result that both the chemist and bacteriologist are apparently necessary, and must give their analyses of a water before a sound conclusion can be arrived at. In certain cases a chemical analysis alone would fail; in other cases, a bacteriological. One thing, however, appears certain, and that is the very greatest importance to be attached to the periodical examination and inspection of the sources, and the knowledge of the history of a water supply, together with the protection of the area around such sources.

(*To be continued.*)

THE PROTECTION OF SURFACE WELLS FROM POLLUTION.

By Adam Morris, Assoc. San. Inst., Sanitary Inspector County of Roxburgh.

To protect the water of a surface well from pollution, the well should be lined with bricks or clean stones, well built, and set in cement. This steining should be carried above the surface of the ground to a height of at least 1ft., to keep any surface washings from entering the well. Koch has recommended, as an effectual means of protecting well water from occasional surface pollution, that an additional lining of impervious clay puddle should be carried round the well, between the retaining wall and the subsoil; this puddle wall to be carried down to a depth of 10ft. Before reaching the water of a well so protected, any surface contamination would thus be filtered through the soil, the organic impurities being presumably nitrified by the action of the life (bacteriological and vegetable), at the

surface of the soil. There is also an amount of mechanical filtration. That this method of protection is often efficient I can testify from my own experience, but it will only answer where the surface pollution is comparatively small and intermittent, and where there is abundance of life in the soil. Where the soil is saturated with polluting organic matters, so as to kill the purifying agents in it, or where there are leaking drains or cesspools in the near vicinity of a well, the above-named method will be of little use.

Perhaps the most satisfactory manner of protecting a surface well is to carry the puddle lining already described round the outside of the well, and as far as possible into the water-bearing stratum. This method will effectually prevent any surface pollution in the immediate neighbourhood from soaking into the well. Subsoil water, however, frequently travels long distances after meeting with an obstacle to its percolation into the earth, and, if it has passed through a soil which has contained much refuse matter, it may carry polluted water to wells which might be looked upon otherwise as in good and safe situations. It should distinctly be understood that no amount of so-called protection of a surface well will be of the slightest use in improving the safety and quality of the water if the sub-soil water is obtained from a soil that is filth-saturated with the refuse accumulations of years, or if badly-constructed drains and cesspools are voiding their contents into the subsoil to intermix with the subsoil water. In such case, and more especially when analysis of the water shows pollution from organic sources, the only safe method to adopt is to close and fill up the well, and obtain a fresh supply from a pure source.

It should also be remembered that the flow of the subsoil water is almost invariably towards rivers and watercourses. Surface wells are sometimes sunk on flat low-lying land near rivers or streams, the prevalent idea being that water will find its way to the well from the river or stream, subjecting itself to a process of natural filtration and purification in its passage. This idea is generally erroneous, as in almost every instance the flow is from the well to the river. This is important, for where a well lies low, or in a natural basin, the land of which is cultivated and manured, or where the farm steading is at no considerable distance away on rising land, the well will in all probability receive a large share of the natural drainage, and consequently the water will be dangerous to use.

All wells should be closely covered with stone flags set firmly with good cement. On no account should wood covers be used, as they decay rapidly, and pollute the water. A pump should be provided —either an ordinary suction pump or a force pump, according to the height to which the water has to be lifted—and a properly constructed socket-jointed pipe drain should be laid from beneath the pump to a point some distance below the well, to carry away all surplus water and surface washings, and so prevent the possibility of their return to the well.

POLMONT.—The engineer's estimate for the proposed water supply for the district is £5000. Meetings are being held for the purpose of presenting a requisition to the County Council.

Reviews.

Vaccination a Delusion. Its Penal Enforcement a Crime. By ALFRED RUSSELL WALLACE, LL.D., Dubl., D.C.L., Oxon., F.R.S., &c. Swan, Sonnenschein & Co., Limited. Price 1s. 92 pp.

THIS essay is one written primarily for the purpose of influencing Parliament and securing the abolition of the vaccination laws. The author has collected a considerable amount of information on the subject from the Reports of the Royal Commission and the Registrar-General, and he claims that he abundantly proves, doubtless to his own satisfaction, that in all previous legislation our legislators have been misled by facts and figures that are untrue, and by promises that have been unfulfilled, and that similar statements have characterised the whole official advocacy of vaccination from the time of Jenner to the present; and, moreover, that all official statements as to vaccination are *untrustworthy*. While we are unable to agree with many of the conclusions at which the author arrives, we cannot withhold expressing our opinion that he has written ably and conscientiously on a subject which is of such a controversial character.

Premature Burial: Fact or Fiction? By DAVID WALSH, M.D., Edin. Price 1s. 6d. Bailliere, Tindall, and Cox. 49 pp.

THIS little *brochure* has been compiled in part, we believe, as a reply to a pamphlet entitled "Premature Burial," by W. Tebb and E. S. Vollum, M.D., which is on the affirmative side of the subject, and partly to counteract the sensational paragraph writers of our daily newspapers. The author has, in our opinion, succeeded in showing that the possibility of being buried alive is very remote, hardly amounting to a probability, and only then when hasty burials may be necessary, as in hot countries, upon battlefields, and in time of plagues. After examining from a medical standpoint many of the wonderful narratives which have been published in newspapers and books, of persons being buried alive, and subjecting them to careful scrutiny, he arrives at the conclusion that the mass of reported cases of premature burial is worthless from the point of view of exact evidence.

Handbook of the Workmen's Compensation Act, 1897; with approved Schemes of Compensation; Statutes referred to; Notes on Accidents; Negligence and Misconduct; Employers and Workmen's Liability. By M. ROBERTS-JONES, Barrister-at-Law. Price 2s. 6d. Fifth edition. Cardiff: *Western Mail*, Limited. London: 82, Fleet-street. Demy 8vo., 82 pp.

THIS is an excellent little manual by a gentleman who is well qualified to write on the subject which he evidently has warmly at heart. The Workmen's Compensation Act, 1897, comes into operation on the 1st July next, and as it affects a large number of employers of labour — including Urban and District Councils—who require to be conversant with its provisions, the book will be found of considerable value to them, being, as it is, annotated, and also containing extracts from the speeches of

members of the Government, which show the intentions of the Legislature in framing it. Surveyors of Local Authorities will need to have an acquaintance with the Act, inasmuch as workmen suffering accidents, whilst employed on engineering works, including excavating, road repairing, drain laying, &c., will be able to claim compensation. To them, and to all employers of labour, we can heartily recommend this edition of the Act, as it is clear, concise, and well-arranged.

Annotations from Annual Reports.

Inspection of Bakehouses.—Dr. E. Hugh Snell, Medical Officer of Health, Coventry, alludes in his annual report to the tangled intricacies of the Factory and Workshop Acts, which he contends "do much less to ameliorate unhealthy conditions than was probably intended by their framers. The present condition of affairs is also fostered, so far as this city is concerned, by the paucity of skilled assistance in the way of Inspectors which is available for the regular inspection of bakehouses, without neglecting other more urgent duties. It is certainly desirable that the bakehouses should be inspected regularly several times a year. Under the present circumstances this is an impossibility. In many I find that too little attention is paid to general cleanliness. Lime-washing and cleansing is in some done regularly ; in others this is not so. In a number of instances there is no possible contrivance to aid ventilation, except the occasional opening of the door. I have found that there is a very general lack of information among occupiers concerning the fact that there are regulations affecting the management of bakehouses which can be enforced."

Why Hygiene Should be Taught in Schools.—This question comes prominently to the fore in the report of Dr. Henry Kenwood, M.B., L R.C.P., Medical Officer of Health St. Mary, Stoke Newington. The excessive mortality in his district, he points out, was furnished entirely by summer diarrhœa, measles, and whooping-cough, among the infant population ; it was practically restricted to the children of the poorer classes, and was largely due to parental ignorance and neglect of the elementary laws of health and disease prevention. When our system of education also concerns itself with teaching every scholar the vital matters which are of the first importance to the individual and the community—even to the sacrifice of some of the purely ornamental matter that is now taught, the sooner will every parent in the land possess the knowledge that will help them to put into operation the essential laws of health and the rudimentary principles of infant rearing ; and then there will come a great reduction in the infantile mortality. The increase due to diphtheria was also a factor in promoting the excessive death-rate for the quarter referred to, and he is convinced that some of the increased mortality from this disease may be attributed to the manner in which children, of the most susceptible ages for the infection, are crowded together into our elementary schools, without any sufficient attempt—as by the systematic medical inspection of scholars—to ensure that they are free from infection. It is admittedly a difficult matter to put into operation, but the sort of medical inspection required may be—from his own experience—very rapidly performed, and with very little hindrance to school work, and it is already being practised on a large scale in America, with the most promising results.

INCORPORATED
Society of Medical Officers of Health.

THE SANITARY SUPERVISION OF SCHOOLS.

Dr. E. Seaton, Medical Officer of Health to the Surrey County Council, the president, occupied the chair at the last meeting of the session held by the Incorporated Society of Medical Officers of Health on Friday evening last, at the Board-room of the St. Giles' District Board of Works, High Holborn. There was a good attendance, those present including Dr. R. Dudfield, Dr. T. Groves, Dr. L. C. Parkes, Drs. S. Davies, T. Barley, J. S. Tew, T. Carr, Mr. Wolff Defries, Drs. E. Chissolm, W. Gruggan, H. Stott, E. F. Willoughby, R. W. D. Mair, L. F. Bryett, H. B. Collins, S. R. Lovett, A. Newsholme, E. A. Dorrell, and Dr. F. J. Allan, hon. secretary.

Dr. Edmund Gwynn, Medical Officer of Health to the Vestry of Hampstead, was unanimously chosen as President of the Society for the ensuing year, which will commence in October next.

A conference of delegates representing various societies interested in public health was recently convened by the Society of Medical Officers of Health for the purpose of considering the question of the new Vaccination Bill in its relations to sanitation and sanitary work. The following resolutions were adopted at the conference, and being now submitted to the Society, were unanimously endorsed and confirmed :—

(1) That the age limit within which a child should be vaccinated after birth should be six months.

(2) That evidence of efficient vaccination should be afforded on the admission of a child to a public elementary school.

(3) That a clause should be inserted in the Act defining "efficient" vaccination.

(4) That it is essential that the State should take steps to require the re-vaccination of all persons on their attaining the age of twelve years.

(5) That the powers and duties with regard to vaccination should be transferred from the Poor Law to the Sanitary Authorities.

(6) That the Government should pay for vaccination performed by general medical practitioners, subject to the vaccination being done in accordance with the regulations of the Local Government Board, and being open to inspection.

Dr. R. Dudfield, Medical Officer of Health, Paddington, read a paper on "The Sanitary Supervision of Schools," which dealt particularly with overcrowding in schools, and the limitation of the spread of infectious disease. It could not be denied, he said, that school attendance plays an important part in the spread of those infectious diseases to which children are most prone, and therefore there could be no difference of opinion that every effort

should be made to ensure that compulsory education should be carried out under conditions which shall not only minimise the possibilities of the spread of disease, but also in no way prejudice the health and vigour of the scholars in later life. At the present time overcrowding was perhaps one of the conditions most generally accepted as prejudicial to health, and it was therefore surprising to find that the Education Department tacitly, if not willingly, allowed overcrowding to occur in the schools under its jurisdiction. In support of this statement, Dr. Dudfield quoted at length from the Education Code. The maximum cubic space per child provided for was 120ft., and 96 cubic feet as a minimum, but the only standard prescribed by law is that under the Factory and Workshop Act, 1895, which is 250 cubic feet for day work, and 400 cubic feet overtime. The contrast was marked, and the circumstances demanded attention. The only grounds for such a scanty allowance for a child was that there was a difference in the amount of the impurities of the expired air and exhalations of a child as compared with those of an adult. But children could not bear the chilling effects of draughts as well as adults, and were more susceptible to the ill-effects of vitiated atmosphere. With 120 cubic feet air space per child it would be necessary on the theoretical standard of permissible respiratory impurity to renew the air of a school-room twenty-five times during the course of an hour. According to Du Chaumont three changes in the hour are as many as can be safely and comfortably borne. Dr. Dudfield then examined the School Code with regard to attendances, and showed there was much elasticity in respect of attendance in excess of accommodation, through the desire to prevent the exclusion of scholars simply on the ground that any given room is full. Under Article 78 it was prescribed that a child should be refused admission on "reasonable grounds" only, and the fact that a room or class was full did not appear to the Education Department a reasonable ground for such refusal. They held that the child should be admitted, and that temporary overcrowding be abated by a re-arrangement of the classes. The sanitary aspects of this overcrowding occupied a secondary position. So long as every child was caught in the school net and found a place in a class not too much in excess of the legal number for which the teacher is certified, due regard being paid to the "skill, health, and energy of the teacher," the influences which may react to the detriment of the child's health and vital powers may be set aside pending the necessary re-organisation of the classes, if that be possible. Only a small proportion of the children attended regularly, and the teacher was tempted to make up the average whenever possible. Indeed, it seemed to be an impression among teachers that under Article 73 they were allowed to overcrowd the school-rooms to an extent not exceeding 15 per cent. of the certified accommodation, which was doubtless a wrong interpretation. Among the considerations to which he wished to draw attention, was—What is the range of infectivity of those infectious diseases to which children are most predisposed, such as measles; and how far does the vitiated atmosphere of the school-room favour the spread of such diseases? Many children were continuously under the influence of vitiated atmosphere, their homes being unfortunately as bad as the schools with respect to air space. Dr. Ransome's recent experiments in the cultivation of the tubercle bacillus on papers saturated with moisture condensed from the breaths of persons in health and disease, suggested serious thoughts with regard to overcrowded school-rooms containing children, some of whom might be incubating disease. All Medical Officers of Health had arrived at the conclusion that something should be done to limit the spread of measles and whooping-cough, but they had not yet agreed upon the best course. It seemed to him that the code should provide for the systematic notification by teachers and school visitors. There should be complete interchange of information between the Medical Officers of Health of adjacent Authorities with a view to anticipating the progress of disease from one district to another. Having dealt with the question of disinfecting after measles, Dr. Dudfield said it should be made law that no children belonging to a family infected with measles should be allowed outside the house or tenement until the family had been declared free from infection. With family isolation and disinfection he believed that much might be done to limit the spread of measles. There was also need for securing uniformity as to the duration of exclusion from school, and he thought there ought to be a schedule of quarantine periods. As the probability of action by the Local Government Board was remote, he thought the Society might take the matter up and issue a schedule to the Medical Officers of Health. In concluding, he submitted the following resolutions for the consideration of the Society:—

(1) That this Society is of opinion that no scholars in excess of the number for which such room is certified should be assembled in any class-room of a public elementary school for the purpose of instruction.

(2) That this Society is of opinion that active measures are needed for the limitation of the spread of infectious diseases not included in the schedule of diseases to be notified, and with that object recommends:—(*a*) That a school teacher excluding a scholar on account of the existence of measles or whooping-cough, either in such scholar or in the home of such scholar, and a School Attendance Officer on discovering the existence of any of the said diseases in the home of any scholar should forthwith notify the Medical Officer of Health of the district in which such scholar resides of the existence of such disease; and (*b*) that no scholar excluded from school on account of measles or whooping-cough, as set out in the preceding resolution, should be re-admitted to school until the Medical Officer of Health of the district in which such scholar resides shall have certified that the home and articles therein likely to retain infection had been adequately disinfected.

(3) That this Society is of opinion that an official table of definite periods of quarantine is needed for the guidance of school teachers and officers.

(4) That this Society, recognising the importance of maintaining the efficiency of all public elementary schools, is of opinion that Article 1101 of the Education Code should be amended to allow of a school counting the attendances of any scholar excluded on the certificate of the Medical Officer of Health in which the scholar resides during the period covered by such exclusion.

Dr. F. J. ALLAN read a number of letters from

members who were unable to attend, expressing their views on the subject of the resolutions.

Dr. L. C. PARKES supported the resolutions, and said that the paper had been an extremely useful one. He thought they might go further than Dr. Dudfield, and lay down some definite figure for the minimum air space, say not less than 200ft. cubic space. The present arrangements were totally inadequate. He had been preparing statistics, which showed that there was an epidemic period for measles about every two years, and he thought that this knowledge now being pretty well ascertained, the infant departments of the public elementary schools should be closed when the epidemic first threatened. He believed by this method the spread of the disease would be checked, if not entirely stopped.

Dr. NEWSHOLME gave particulars of arrangements at Brighton, by which the teachers at once notified the absence of scholars through infectious disease.

Dr. WILLOUGHBY said that in Ontario the Government Department came to the conclusion that a minimum air space of 250 cubic feet should be the standard, and this was adopted in all Canadian schools.

Drs. J. S. TEW and H. STOTT explained the circumstances pertaining to rural parishes, the latter remarking that the Education Department should be impressed with the necessity of proper heating and ventilation arrangements in the schools.

Dr. S. DAVIES sincerely hoped that some practical steps would follow the practical paper Dr. Dudfield had given them, and he would be prepared to move an amendment to the first resolution defining the limit of 200 cubic feet.

Drs. GROVES and COLLINS having spoken,

Dr. PARKES suggested that the resolution should go to the Council, who should be empowered to formulate a memorial to the Education Department, and that it should be printed in separate form so that every member of the Society could sign it. This would make it a powerful memorial which ought to carry weight with the Government.

Dr. DUDFIELD replied to some of the points raised, and expressed his willingness to adopt the suggestion to refer the matter to the Council on the understanding that the resolutions remained intact as a basis on which the Council could work in preparing the memorial.

The resolutions accordingly stated referred to the Council, and a hearty vote of thanks to Dr. Dudfield for his paper, passed on the motion of the PRESIDENT, closed the meeting.

PORTMAGEE.—At a recent meeting of the Cahirciveen Board of Guardians a long discussion took place as to the outbreak of fever at Portmagee. It was pointed out that the number of cases was increasing, and the source of the disease was attributed to the bad water supply and the unsanitary condition of the village. A letter was read from the Congested Districts Board pointing out that it could not give a grant towards the proposed water supply. It was proposed to ask Trinity College to make a sewerage drain in connection with the back yards of the houses.

Sanitary Inspectors' Associations.

THE NORTH-WESTERN AND MIDLAND.

THE annual meeting of the above Association was held at the Liverpool Royal Institution on Saturday last, the 16th inst. There was a good attendance of members, including representatives from Liverpool, Manchester, Crewe, Waterloo, Formby, Birkdale, St. Helens, Wallasey, Urmiston, Lymm, &c. The chair was taken at the commencement of the proceedings by Mr. William Urquhart, Crewe, the retiring chairman. After the transaction of the routine business, the Chairman announced that the Council had unanimously selected Mr. William Stansfield, Chief Sanitary Inspector, Manchester, as its Chairman, and that it was his pleasing duty to formally install Mr. Stansfield into his new position.

Mr. STANSFIELD expressed his keen appreciation of the honour conferred upon him, and promised to lose no opportunity of furthering the interests of the Association.

Messrs. Sydney Bayliss (Birmingham), James Walton (Manchester), and John Roberts (Llanrwst), having been elected to membership, and Messrs. James J. Topping and Fred Woodward, West Bromwich, to associate membership, and some additional nominations having been received, the Hon. Secretary was called upon to read the eleventh annual report of the Council.

The Council expressed its gratification at the continued success which had attended the work of the Association during the past session. Seventy-two additional names had been placed on the roll, which now comprised 32 honorary members, 226 members, and 15 associate members, or a grand total of 273. The area of membership had similarly increased, 115 distinct urban and rural sanitary districts being represented, as compared with 87 in the preceding year. The validity of the claim of the Association to being the representative body of Sanitary Inspectors in the North-Western and Midland districts had been strengthened in many respects. Negociations for amalgamation with the Sanitary Inspectors' Association for Carnarvonshire had been carried to a successful issue, and the prospects of the Association in North Wales were of a most favourable description.

Fifteen sessional meetings had been held, and had been characterised by a greatly-improved attendance. Several of the meetings were record ones—notably the highly-successful public conference of Sanitary Inspectors, convened by the Association, and held at Birmingham in October last.

High appreciation was expressed of the great services rendered by the President, Dr. Vacher, during the past year, and warm thanks given to the authors of the lectures and papers which had been delivered, and to the Editor of THE SANITARY RECORD for the liberal space he had afforded for reports of meetings of the Association.

The treasurer's statement having been read, the report and statement were unanimously adopted.

On the motion of Mr. BLAND (Urmston), seconded by Mr. R. LOWE (St. Helens) a hearty vote of thanks was unanimously accorded to the past Chairman of Council, Mr. W. Urquhart

(Crewe), and to Messrs. N. Coates, and H. H. Spears, the hon. treasurer and secretary respectively of the Association, for their services. The vote was acknowledged in suitable terms by the members concerned.

The election of officers was then proceeded with, and in view of the approaching reorganisation of the Association, it was unanimously resolved that the honorary officers should all be re-elected. Dr. Francis Vacher, Medical Officer of Health, Cheshire C.C., therefore becomes again the President of the Association, Drs. Hope, M.O.H, Liverpool; E. Sergeant, Lancs. C.C; Geo. Keir, Staffs. C.C.; and W. Carter, Liverpool, Vice-presidents. Chairman of Council, Mr. Wm. Stansfield; Vice-chairmen, Messrs. E. Worrall (Penmaenmawr), F. T. Poulson (Stafford), and W. Bland (Urmston); Librarian, W. E. Gleave (Liverpool); Hon. treasurer, N. Coates; Auditors and Scrutineers, D. B. Cowden and R. Dacres; Hon Secretary, H. H. Spears (Waterloo).

At the conclusion of the general business, a special meeting of the Association was held to consider the new scheme for reorganisation submitted by the Council. The proposed amendments to rules were considered *seriatim*, and at some length, but with the exception of one or two trifling verbal alterations, the scheme was unanimously approved, and the rules ordered to be amended in pursuance therewith.

Under the new scheme the local work of the Association will be carried on by district centres, of which three are at present formed, viz., North-Western (embracing Lancashire and Cheshire), Midland, and North Wales.

Four general meetings of the Association are to be held in each year, and in so far as is practicable, are to be held alternately in the respective districts of the local centres. The election of members, hon. members, and associates, is to take place at the general meetings of the whole Association, but applications for membership are to be approved in the first instance by the members of the local centre in whose area the applicant resides. The management of the Association is to be vested in a Central Executive Council, to be elected annually, and to consist of (*a*) the chairman and secretary of each district centre *ex-officio*, and (*b*) representatives directly elected by each district centre in the proportion of one councillor for the first thirty names on the books, and an additional representative for each succeeding fifty names. Meetings of the Central Executive Council are to be held on the same dates and places as the general meetings of the Association, and Councillors are to be paid their actual third-class railway fare when journeying by train to the place of meeting. Subscriptions are to be collected locally, but are to be transmitted to the Treasurer of the Association, and the administration of the finances is to be vested in the Central Council, who are to defray the current and authorised expenses of the district centres. The various district centres are to have full control of their own district business, and to elect their own district officers and councils.

The annual meeting and conference under the new constitution was fixed for July 1st and 2nd, and will in all probability be held at Manchester.

Having regard to the thoroughly broad, liberal, and representative nature of the amended constitution, the Council and officers are of opinion that a large number of Inspectors will be attracted to the Association, and that its future progress is assured.

NATIONAL REGISTRATION OF PLUMBERS.

THE eighth annual meeting of registered plumbers in the Glasgow and West of Scotland district was held on Thursday, the 14th inst., in the Accountants' Hall, when there was a good attendance. In the unavoidable absence of the president, ex-Bailie Crawford, the chair was occupied by Bailie James Dick. The annual report of the District Council was submitted. In it the Council stated, "During the period now to be reported on the Council are glad to say that the movement has continued to progress satisfactorily. It is true that the Parliamentary measure to which they, in common with the Worshipful Company of Plumbers, and with the other councils throughout the United Kingdom, and with all who are interested in the public health, attach so much value, has not yet found a place upon the statute book; but meanwhile the public sense of the importance and responsibility of the plumber's calling grows and deepens, and the education of the young plumber and hall-marking of qualified masters and operatives go on apace. With these influences at work all over the country, the Council look forward with every confidence, not only to the early passing of the Plumbers' Registration Bill into law, but to the solid and increasing advantages which are being, and will be, yearly gained by the registration movement alike for the trade and for the general community."

The report gave full details of the educational work carried on by the Council in theoretical and practical plumbing classes in Glasgow and Ayr. The Glasgow theoretical classes were now in their tenth session, and the place of Mr. David Fulton, whose premature removal was deplored, had been ably taken by Mr. Alexander Dalrymple, the number of students enrolled being 176. In the Glasgow practical class, conducted by Mr. Francis M'Culloch, the number enrolled this session is 93. At Ayr the classes were now in their fifth session, the enrolments in the theoretical class conducted by Mr. Dalrymple being 40, and the practical class conducted by Mr. Duncan Lamont 19. The Ayrshire County Council had again renewed its grant of £75, and Ayr Town Council that of £10. It was hoped that with the assistance of Greenock Town Council the class for that district might be resumed next winter.

The report also dealt with other matters connected with the movement, including the Plumbers' Registration Bill, which has been re-introduced this session, and which passed through the stages of second reading and Committee last year, but was unfortunately lost through the third reading not coming up until July 7th, which was the last day available for private members. The report also noticed the recent issue of the model regulations and bye-laws prepared by the six District Councils in Scotland, which was the result of much labour and exhaustive discussion. The Worshipful Company of Plumbers had borne the entire cost of production, and had also placed a copy in the hands of the chairmen and officials of all Local

Authorities in Scotland, explaining that the code aims at serving as a compendium of the most approved principles and methods which the scientific inquiry and practical experience of the last fifteen years have evolved as applicable to the drainage and plumbing work of buildings, and at placing in the hands of Local Authorities in burghs and counties a model for their guidance in framing regulations on the important matters dealt with, and also offering permission to any public body duly applying therefor to the publishers, through the District Councils, to make use of the whole or any part of it in drawing up sanitary bye-laws under any statutory powers with which they are invested.

The report concluded by a reference to the annual Scottish Plumbing Congress, which is to be held this year in Glasgow, on the 18th, 19th, and 20th August, and for which the Corporation have granted the free use of the Corporation Galleries, Sauchiehal-street.

On the motion of the CHAIRMAN, seconded by Mr. ALEXANDER BROWN, the report was unanimously adopted. Messrs. James Anderson, J. L. Arnot, Robert Stevenson, James Kilpatrick, and Charles Hegney, jun., master plumbers; Messrs. Andrew Johnstone, William Laing, Thomas Ewing, James Dickie, and Alexander Young, operative plumbers; and Professor John Glaister, M.D., Robert Scott, John Gordon, W. F. Salmon, and Professor Jamieson, public representatives, were chosen to fill the vacancies on the District Council; while ex-Bailie Crawford was re-elected president; Mr. John Gordon, I.A., vice-president; Mr. Archibald Craig, secretary and treasurer; and Messrs. J. L. Arnot and W. A. Rattray, auditors. The proceedings concluded with a vote of thanks to the chairman, proposed by Mr. Laing.

Diphtheria in Worcester.—Dr. Wilfred W. E. Fletcher has presented to the Local Government Board a report on the extensive and prolonged epidemic of diphtheria which prevailed in Worcester during the year 1896, and on the sanitary administration of the city. He states that in 1896 319 cases of diphtheria were notified, of which 49 terminated fatally, according to the Medical Officer of Health, and 51 according to the Registrar-General. During the first half of the year 1897 52 cases of diphtheria were notified, and of these 12 terminated fatally. No common cause of the prevalence could be discovered. The disease was not confined to any particular district, nor could it be attributed to any specially unwholesome circumstances in the portions of the city in which it was chiefly prevalent; indeed, the children, mostly of the poorer classes, who lived in the oldest and most unhealthy parts of the city, seem to have been only very slightly affected by the epidemic. Dr. Fletcher considers that, although the Worcester Town Council have been unusually dilatory in providing sewage outfall works, they have been active in other directions, and much good work has resulted during recent years. Thus, while the Town Council are deserving of severe censure on account of their indifference to the serious pollution of the Severn during many years, by the discharge into the river of the whole of the crude sewage from the city, they are to be commended for much good work in other respects.

Institute of Sanitary Engineers

THE ESCAPE INTO LIVING-ROOMS OF THE PRODUCTS OF COMBUSTION FROM COAL FIRES THROUGH DEFECTIVE CHIMNEYS.

By F. BALL, F.I.S.E., Southwold, Suffolk.

IN the course of my practice as a Sanitary Engineer, it has been my lot, on several occasions, to discover nuisances and dangers to health, instances of which I have not seen recorded, but which I think to be of sufficient importance to justify this paper on the subject.

I do not claim to be the discoverer of a new source of nuisance, for no doubt other Sanitary Engineers have had experience of it as well as myself; but from the absence of records of cases in the sanitary publications, I think the subject has not received the attention it demands. The nuisance alluded to is, from the escape into living-rooms of the products of combustion from coal fires through defective chimney flues. You all know the chemical constituents of common coal and their poisonous nature, and you can readily conceive that the constant breathing of air containing these poisonous gases must be injurious to health. It is analogous to breathing air contaminated with sewer gas, which, if not directly conveying the germs of disease, is admitted to lower the vitality of the human organism and render it less able to resist attacks of disease.

The first case of this evil brought to my notice was at a country mansion in Oxfordshire some fifteen years' since. The house was built of bricks, stuccoed on the exterior, and apparently in a good state of repair, except that the stucco on one of the chimney stacks was cracked and bulged out away from the brickwork.

For many years an unpleasant smell had been noticed in the house, more especially in the drawing-room and bedroom over. The smell being imputed to defective sanitation, an architect was consulted, who had all old fittings removed, and new ones of the best pattern fixed, drains re-laid and ventilated. All water-closets were next the external wall, with soil pipes outside continued to roof and ventilated. Waste pipes discharged over gullies, and there was not a drain in the house.

Still the nuisance was not abated, and the occupant, an elderly lady, who slept in the bedroom over the drawing-room, was continually ailing from sickness and headache. The doctor in attendance concluded the smell in the rooms was the cause of the sickness, because on leaving home for change of air, and even when occupying rooms in a different part of the house, the lady regained good health; but on returning to her old apartments, the sickness came on again.

The sanitary arrangements having been put into good order, the smell was attributed to dead rats or mice under the floors, but on searching none could be found. At the doctor's request I was called in and made an examination of the sanitary arrangements and floors, but without finding anything wrong with the former, or any dead animals under the latter. There was, however, a very strong smell as of unpurified gas in some of the rooms.

Under the floor of the drawing-room the plaster and joists were discoloured with soot, whilst dark lines appeared round the skirting at the fire-place end of the room. Further search disclosed that the recesses formed by the projection of the chimney in the drawing-room were hidden by a framed partition, canvassed and papered, fixed in line with the chimney breast in order to form a straight wall at that end of the room. No use was made of the enclosed spaces, but access was had through a narrow door, which was papered over like the rest of the wall.

On examining the sides of the chimney in these enclosures I found the plaster off in patches, much cracked, and the joints of the brickwork unsound in places; whilst the very strong smell and the accumulation of soot on the edges of the cracks afforded strong evidence of the escape of the products of combustion from the flues. Following this chimney up in the roof the defects were quite as visible. In one place a lath was put through a joint right into the flue, and a current of air was coming through sufficiently strong to deflect the flame of a candle to a horizontal position. This air from the chimney circulated over all the bedroom ceilings. Above the roof, where the stucco was cracked and loose on the chimney stack, the smell was quite strong; whilst soot was accumulated in the cracks. At some previous time alterations had been made at the house, rooms added, and the roof raised. In making these alterations, the trimmers, gutter beds, and flashing had been removed, in doing which damage was done and not made good. This chimney contained four flues, one of which was the kitchen flue, and this from its more constant use and larger consumption of fuel was the worst offender. The flues were 14in. square, capped with terra-cotta pots. They suffered from down-draught at times, the house being on the side of a hill, and overtopped by trees at the back.

Having satisfied the doctor and the occupants of the house that the nuisance was from the gases escaping from the defective flues, a remedy was applied, which, from motives of economy, was not of a very substantial nature, although it has proved effective down to the present time. The remedy consisted of taking down the flue partitions, scraping off soot and old plaster, re-building partitions, plastering all round as the building proceeded, the angles being well filled up to make the flues somewhat round in section. In order to know the result after fifteen years' wear, I wrote to the owner a few months since for information, and received a reply stating that the smell has never reappeared.

The second case was at a house in Upper Seymour-street, London. In this house a smell was observed in the dining-room, which could not be accounted for. The room was at the back of the house on the ground floor, and over the kitchen and scullery. The drainage and sanitary fittings were of the best, and the gas fittings were sound. The family doctor took me to the house and showed me the sanitary arrangements, which had been carried out under his directions, and were sound and good. In the dining-room—the only place where a smell was complained of—the nuisance was greatest near the fire-place, which led me to examine the chimney, when I found the smell proceeded from the bell lever and the skirting below. The lever box was let into the brickwork, which was the front wall of the scullery flue. In cutting away the brickwork to let in the lever box, it had been damaged and the mortar joints shaken, and not made good with plaster. The joints were also loose behind the skirting, apparently from fixing a bell crank. One can readily understand that damage can be done by a careless workman in cutting into 4½in. brickwork of a chimney flue, and in the absence of careful pointing and plastering after, there would be a way for the chimney gases to escape. The doctor was quite satisfied as to this being the cause of the smell, especially as he had noticed a slight cloudiness from smoke in the room at times.

A third case was at a house in Suffolk, in which settlements had caused cracks in the walls and chimney in a bedroom. The cracks in the chimney breast were not large, but the edges were discoloured by soot, and they emitted the smell of unpurified gas, as in the other cases. A gas bracket was fixed to the chimney, and was thought to be the cause of the smell, although a gasfitter had been called in no end of times to stop the leakage, but without result. The occupant, on placing his nose at the cracks, was convinced the smell proceeded from them, and not from the gas bracket.

I have met with other cases, but those mentioned are sufficient to prove that defective chimneys exist, and are a source of nuisance and danger to health. Considering that the walls of chimneys are generally but a half-brick thick; that settlements take place, alterations are made, wooden plugs driven to support pictures, mirrors, and other objects, it is no wonder that flues become defective and allow the gases to escape. Gases ascending a flue can escape through cracks just as the gas does in a pipe which is unsound. There is a slight pressure of gases in a flue by reason of the area of the exit at the top being less than that of the inlet at the bottom, and the expansion through heat of the cold air rushing in above the fire. Then the suction action of fires burning in rooms with doors and windows closed, is sufficiently strong to draw air from every crevice, including those in defective flues.

From the accumulation of sooty particles in the crevices round the edges of skirting and like places, the unconsumed carbon or smoke appears to be arrested in its passage, leaving the invisible gases to escape, and the absence of smoke throws off suspicion from the true cause. In the first case cited, which was by far the worst, no smoke was noticeable in the rooms, although soot was collected on the plaster, the canvas back of partitions, and under the floors. That flues become defective from various causes, and chimney gases escape into rooms, I have proved. That these gases are a nuisance from their odour, and that they are dangerous to health when continually breathed, even in a very diluted form, few can deny.

RYHILL.—A Local Government Board inquiry has been held into the application of the Hemsworth Rural District Council for sanction to borrow the sums of £1695 and £698 for a supply of water for the townships of Havercroft and Ryhill respectively, and the Council having apportioned the cost of the proposed work as above stated, the Overseers of Havercroft appealed against the apportionment to the Local Government Board.

General News.

MORECAMBE.—The cottage hospital scheme is again coming into prominence.

MANCHESTER.—The City Council has decided to borrow £27,000 for the enlargement of the Monsalt Infectious Diseases Hospital.

DURHAM.—The advisability of erecting a new infectious diseases hospital is under consideration by the Health Committee of the Town Council.

LEOMINSTER.—The Town Council has decided to apply to the Local Government Board for permission to borrow £1500 for the new water scheme.

TOWYN.—The subscriptions for the proposed cottage hospital are coming in apace, and there is every probability of the work being begun shortly.

ALTRINCHAM.—The Urban District Council has decided to provide a destructor—the chimney to be 150ft.—at a cost of £800, or with the site, from £2500 to £3000.

LONDON, W.—Out of 609 samples of food, drink, and drugs analysed by the Marylebone Public Analyst during the past year only five were found to be adulterated—two samples of milk and three of butter.

SAUGHALL.—It is understood that as soon as the statutory time given to the Wirral Water Company expires, strenuous efforts will be made to provide the village with an adequate supply of pure water.

CROMER.—A Local Government Board inquiry has been held into an application of the Urban District Council to borrow £2000 for the purchase of land and the erection thereon of an infectious diseases hospital.

BELFAST.—The Corporation has authorised a Committee to take the necessary steps to have the proposed alterations and extensions at the abattoirs carried out—necessitated by the recent extension of the city—which it is estimated will cost £8000.

CARDIFF.—The County Council has decided to apply to the Local Government Board for sanction to the borrowing of £21,600, being £21,000 for the erection of new wards and other additions to the sanatorium buildings and £600 for furnishing such additional premises.

CARLISLE.—The Town Council has decided to include pulmonary phthisis, tubercular meningitis, and tabes mesenterica among the infectious diseases to be notified in the city. The attention of the Medical Officer would thus be called to them, and he would be able to inquire and see if the disease could be traced to the milk supply.

KING'S NORTON.—In the twenty-fifth annual report of the sanitary condition of the area of the King's Norton District Council, the Medical Officer (Dr. F. Hollingshead) deprecated the practice of "tipping" refuse on the roadway. The construction of houses had gone on at a very rapid rate, plans for no less than 1136 houses having been passed during the year. He strongly advised the Authority to adopt the "destructor" as a means of destroying and converting refuse into harmless material. In this way not only would a serious nuisance be abandoned, but material of a useful character provided for the roads.

SELKIRK.—The ratepayers have under discussion a resolution of the Commissioners to introduce a new supply of water by gravitation from Lewinshope and Scaddow Burns, about seven miles up Yarrow. The proposed scheme, when completed, is estimated to cost £17,200, and the supply from 160,000 to 180,000 gallons per day, or about 28 gallons per head per day of the population.

WEDNESBURY.—The Borough Surveyor has been instructed to prepare plans for the erection of a temporary isolation hospital with a permanent fence upon the land belonging to the Corporation near the Lodge Holes. The land forming the site of the existing hospital is to be sold, and the proceeds of the sale are to be devoted to the erection and equipment of the proposed new isolation hospital.

Personal.

MR. J. EVANS has been appointed Inspector of Nuisances for the borough of Carmarthen.

MR. W. H. BESWICK will shortly resign the post of Surveyor for the urban district of Exmouth.

MR. J. HARVEY has been appointed Inspector of Nuisances for the urban district of Swadlincote.

MR. H. MACKAY has been appointed Medical Officer for the south-east district of Sheffield union.

MR. P. C. DORMER has been appointed Inspector of Nuisances for the urban district of Raunds.

MR. A. E. Prescott, Deputy Surveyor, Luton, has been appointed Surveyor to Douglas Town Council, at a salary of £200 a year.

MR. H. R. BURNETT, has been selected by the Barrow-in-Furness Town Council to fill the post of Borough Electrical Engineer.

MR. EDWARD ASTBURY, of Buckley, has been appointed Surveyor for the Buckley urban district at a salary of £100 per annum.

MR. ARTHUR ROTHERA, of Sowerby Bridge, has been appointed to the post of Surveying Assistant to the Rawtenstall Town Council, at a salary of £85 per annum.

MR. E. W. COZENS HARDY has resigned the surveyorship to the St. Faiths (Norfolk) Rural District Council, having been appointed to a similar post at Seisdon (Staffs.).

CHARLES J. MYERS, M.R.C.S., L.S.A., has been appointed Medical Officer of Health for the rural district of Louth, vice Dr. R. Dowenichetti, hon. physician to the Queen, resigned.

MR. FRED. THORPE, assistant gas manager to the Widnes Corporation, has been appointed as gas manager for Colne, in succession to Mr. Symmonds, at a salary of £225 per annum.

MR. J. P. HORSFIELD is shortly leaving King William's Town, Cape Colony, to take up the appointment of Sanitary Inspector at Salisbury, Mashonaland. He will be the first Sanitary Inspector there.

MR. GORDON BRYANT, assistant engineer at the Electric Lighting Station, Yarmouth, has been appointed chief engineer in succession to Mr. A. W. Ranken, resigned. His salary is to be at the rate of £175 a year for the first six months.

Sewerage Schemes.

[To Municipal Engineers and Surveyors.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

The Higham Ferrers Town Council has decided to apply for a further loan of £146 for the sewerage works.

The Local Government Board has sanctioned the borrowing of £236 for the sewerage works at Pendleton.

The Urban District Council of Chesterton has decided to apply to the Local Government Board for permission to borrow a further sum of £350 for sewerage works.

The Local Government Board has sanctioned the borrowing by the Alnwick Council of the sum of £700 for works of sewerage and sewage disposal for the township of Warkworth.

A new filter-bed is to be constructed at Northampton, according to plans by Mr. Emson, at an estimated cost of £5500; £3000 for the filter-bed, and £2500 for filtering material.

The Urban District Council of Tunstall has adopted plans and estimates of a new sewerage and sewage disposal scheme, and has decided to apply for a loan of £22,977 15s. 11d.

The Heywood Town Council has decided that the available land at the sewage works at Botany be laid out for filtration purposes, in accordance with the recommendations of the engineer.

The Town Council of Monmouth has decided to apply for powers to borrow an additional £10,000 for the purpose of completing the drainage portion of the combined scheme for drainage and electric light.

A Local Government Board inquiry has been held at Stowmarket as to the application of the District Council and the East Stow Rural District Council for sanction to the borrowing of £5100 for the purpose of a joint scheme of sewerage and sewage disposal for the urban district and parishes of Stowupland and Combs.

The Vestry Clerk of Camberwell recently wrote the Greenwich District Board stating that, owing to the complaints that were continually being received with regard to emanations from the road surface ventilators, the Vestry had decided to convene a conference of representatives from the Sanitary Authorities of South London on the subject of sewer ventilation, with a view to combined action in reference to the matter, and stating that the conference had been fixed for Wednesday, May 4th.

The Bourne Rural District Council has decided not to proceed with the drainage scheme for the village of Horbling, Lincolnshire, as proposed by Mr. Radford, C.E., of Nottingham. This provided for a sewerage farm at a cost of £1300, exclusive of maintenance. An alternative and less expensive scheme is under consideration. The Parish Council protested against the outlay.

At a recent meeting of the Coventry City Council the City Engineer reported that the contractor for the construction of the outfall sewer, rising mains, &c., in connection with the Lodge Farm sewage disposal scheme, had commenced operations. It was decided that Mr. Samuel Toon be appointed Inspector to superintend the laying and jointing of the pipes under this contract at a salary of £150 per annum.

Mr. Bosley, Superintendent of the Guildford outfall works, has reported to the Town Council that during the past two years the expenditure on the farm for horse hire, occasional labour, and general farm expenses, amounted to £86 10s. 2d., and the returns amounted to £149 13s. 3d., showing a profit for the two years of £63 3s. 1d. The whole of the works were maintained in good order, and the effluent continued to be a good sample.

A special meeting of the Belfast City Council was held last week to make an order under the provisions of the County Antrim and Belfast Borough Act, 1865; the Belfast Borough Act, 1868; the Local Government Board (Ireland) Provisional Order (Belfast) Confirmation Act, 1873; and the Belfast Improvement Act, 1878, that a portion of the city shall thenceforth constitute a separate drainage district, to be called the Ligoniel district.

Lighting.

The Local Government Board has sanctioned the loan of £30,000 for the electric lighting of Carlisle.

The Manchester City Council has decided to borrow £150,000, subject to the approval of the Local Government Board, for electrical works.

The Milton-next-Sittingbourne District Council has reduced the price of gas from 3s. 4d. to 2s. 11d. for private lighting, and from 3s. 4d. to 3s. for public lighting.

The Amsterdam City Council has decided to take over the gasworks. To meet the cost the issue of 3½ per cent. municipal bonds to the amount of 18,000,000fl. has been decided upon.

It is understood that the electric light is being introduced into the Picture Gallery at Holyrood Palace, in view of the residence at the palace next month of the Earl of Leven and Melville, the Lord High Commissioner.

THE foundation stone of the new Wycombe electric light works was to have been laid last Saturday by Mr. R. S. Wood, Chairman of the Electric Light Committee of the Wycombe Town Council.

ON the recommendation of the Lighting Committee of Buckie Council the Police Commissioners have instructed their surveyor to prepare an estimate of the cost of lighting Buckpool with acetylene gas.

PROFESSOR ROBINSON'S report on the electric lighting question at King's Lynn was received by the Town Council last week, and it was decided to apply to the Local Government Board for sanction to a loan of £30,000 for electric lighting in the town.

AT a recent meeting of the Watching, Lighting, and Fires Committee of Aberdeen Town Council it was resolved to extend the overhead system of electric lamps in George-street, between Loch-street and Hutcheon-street, at an estimated cost of £230.

A LOCAL Government Board inquiry has been held at Egremont relative to an application by the Wallasey Urban District Council for powers to borrow £20,795 for purposes of electric light extension, £5600 for new water mains and other purposes, and £1182 for certain street improvements.

A REPORT on the question of an electric light installation in Gourock has been presented to the Burgh Commission. It states that the estimated cost of laying an installation would be about £8600, including plant sufficient to light the whole of the burgh and the erection of sixteen arc lamps along Shore and Kempock-streets.

MR. R. F. YORKE recently submitted his report on the water-power available at the Touch reservoirs for the electric lighting of the town to the Police Commissioners of Stirling. Mr. Yorke finds that by utilising the available water-power the Commissioners may obtain a constant guaranteed output of 54 brake horse-power from the turbines, which, after allowing for losses in the dynamo, cable, and electric storage, is capable of producing a supply of 618 units per day, which is sufficient for supplying the extended area of the town with 8000 lamps of 8-candle power connected, or one lamp for every two inhabitants. If in the future additional power was required it could be obtained from No. 4 reservoir, at present untapped, to the extent of 4000 more lamps. The capital outlay is estimated at £13,500, and allowing £675 per annum for interest and sinking fund, which was 5 per cent. on the capital outlay, made the total annual cost on the undertaking £1325. Taking 100,000 units as the number to be sold per annum, and charging at the rate of 4½d. per unit (which was considered to be equivalent to gas at 2s. 6d. per 1000 cubic feet), the revenue produced would be £1875 per annum, thus leaving a clear profit of £550.

THE Town Council of Stirling has unanimously resolved to oppose the Gas Company's Bill, which was passed by the House of Lords' Committee, before the Committee of the House of Commons.

THE Yarmouth Town Council has resolved to apply to the Local Government Board for sanction to a further loan of £4800 to increase the lengths of mains and sub-stations for the electric lighting of the town. The items in the application will be:—Steam engine, 150 kilowatt alternator and steam pipes, £2800; additional high and low-tension mains, £1600; transformers and transformer stations, £400. The present sanctions amount to £35,200, and the sanction now proposed to be asked for will make the amount of the loans £40,000. The Council has also resolved that Mr. Preece be consulting engineer for the new engine and alternator.

THE Gas and Electricity Committee of the Bradford Corporation has decided to make substantial reductions in the price of electric current, both for lighting and for motive power. The scale at present in operation provides for a charge of 5d. per Board of Trade unit for lighting and 2½d. per unit for motive power. The Committee has decided to recommend the Town Council to reduce the charge for lighting to 4½d. per unit and to adopt a new scale for motive power. This will provide that for a minimum of four hours' continuous use with a consumption of 550 Board of Trade units the charge shall be reduced to 2d. per unit, with intermediate reductions up to eight hours' continuous use and 1200 units' consumption, at which the charge will be 1d. per unit.

HACKNEY is desirous of emulating the example set by St. Pancras. A "town's meeting" of the ratepayers was held on Monday night at the Hackney Town Hall to ascertain the opinion of the inhabitants on the proposed selling of the electric lighting order to a limited company. Mr. George Chambers, the chairman of the Vestry, presided. Mr. B. Dent moved the first resolution as follows:—"That this meeting is of opinion that it would be detrimental to the best interests of the ratepayers of Hackney to part with the electric lighting order, and therefore recommends the Vestry to keep the order in its own hands. This meeting further hereby protests against the creation of an electric lighting monopoly in Hackney." Mr. H. J. Taylor seconded, and said that London had had enough of monopoly in gas, water, and trams. Mr. Lampard, L.C.C., and others followed in favour of the resolution. Mr. Henry Holland, the chairman of the Electric Lighting Committee, argued that the Vestry could re-purchase the order at the end of twelve years as a going concern, and that if the proposed scheme was carried out the company would collect the house refuse to be consumed at the generating station and save the parish £5000 a year. The prices to be charged by the company in Hackney would be considerably lower than in other London districts. The chairman put the resolution, and declared it carried by fifty to three. It will be interesting to note the value attached by the Vestry to the passing of this resolution.

THE estimates of the Manchester Corporation Gas Committee for the year ending on the 31st March next were submitted and approved at a recent meeting. On the profit and loss account the estimated expenditure reaches £509,300, including £228,000 for cannel coal and oil, £45,000 for retortmen's wages, £60,000 for repairs and maintenance of works and mains, £30,000 for salaries and wages of clerks and inspectors, £36,500 for interest on loans, and £27,921 as a contribution to the sinking fund in liquidation of debt. The receipts are expected to produce £560,500, made up chiefly of £475,000 from gas rents, £40,000 from coke, £26,000 from tar, and £19,000 from ammonia water. There will thus be a surplus payable to the City Fund for the relief of the rates of £51,200.

Correspondence.

We do not in any way hold ourselves responsible for opinions expressed by our correspondents.

A DISCLAIMER.

(*To the Editor of* THE SANITARY RECORD.)

SIR,—It has come to the knowledge of the Directors of Dr. Tibbles' Vi-Cocoa (1898) Limited, that a report is in circulation that a Mr. Harness is in some way connected with or interested in the business of Dr. Tibbles' Vi-Cocoa (1898) Limited. Will you permit me to contradict this report publicly in your columns? It is wholly without foundation. I speak with authority on the matter, for I am now Secretary to the present Vi-Cocoa Company; I was Secretary to the former Vi-Cocoa Company during the whole period of its existence; and I was in the employ of the owners of the business before either Company was formed. Hence I am in a position to state positively that no person of the name of Harness has ever been in any way concerned or interested or in any way connected with that business or either Company.—Yours faithfully,

G. BROOKE SMALLEY,
Secretary to Dr. Tibbles' Vi-Cocoa (1898) Ltd.
60, 61, and 62, Bunhill-row, London, E.C.,
April 13th, 1898.

PUBLICATIONS RECEIVED.

House Drainage and Sanitary Plumbing. By Wm. Paul Gerhard. Seventh edition. New York: D. Van Nostrand Company. Price 50 cents.

Tuberculosis and the Public Health. By Geo. Lane Mullins, M.A., M.D. Sydney: John Sands,

The Report of the Royal Commission on Vaccination; a Review of the Dissentients' Statement. By John C. McVail, M.D. London: P. S. King and Son.

Association of Surveyors of H.M. Service. Occasional Papers. Fourth series. *Building in St. Lucia.* 2s. 6d. Inverness: Robert Carruthers and Sons.

Sanitation in the British Mercantile Marine. By William S. Romeril. *Shipping World* Company, Ltd. 3s. 6d.

The above acknowledgments do not necessarily preclude further notice. Any of the books mentioned may be obtained of the Sanitary Publishing Company, Ltd., 5, Fetter-lane, London, E.C.

Notes and Queries.

Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C.

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

1042.—DRAINS TO NEW BUILDINGS: TESTING.—"J. H." writes:—"I should be glad to know what is the practice with regard to testing drains to new houses, or re-laying of old drains. Do you consider the testing of the drains by the hydraulic or water test sufficient?"

Answer.—The practice with all Authorities of repute is to require that new drains be tested with the hydraulic or water test when laid and before being covered up. Inasmuch, however, as it often happens that the water-closet pans, gullies, &c., are not connected to the drains when the trenches are open, and as the drain pipes may be disturbed in the act of filling, it is necessary and most desirable, when the house is finally inspected before occupation, that the drains be again tested by the smoke test applied by the smoke machine. We have seen so many instances where the water-closet pans within houses have been found to be improperly connected to the drain or soil pipe, and the latter improperly constructed within the house, which would not otherwise than by the use of the smoke test be discovered, that we should not advise any surveyor or Inspector to certify that a house is fit for, or permit its, occupation until such test is carried out. If this practice be insisted on in all cases it will save much subsequent trouble.

1043.—SEWAGE DISPOSAL FOR SMALL VILLAGE: SCHEME PROPOSED.—"Q." writes:—"The sewage from a small village in my district discharges into a ditch, causing a serious nuisance. It is impossible, even by going an unreasonable distance, to enable the sewage to be applied to land, and I am at a loss to know what is the best plan to adopt. Pumping could, of course, be resorted to, but the expense for such a small scheme for 150 inhabitants is prohibitive. The only practical method, so far as I can see, is to filter the sewage; and this I propose to do by constructing duplicate tanks at the outfall, 20ft. by 4ft. by 4ft., which I consider would efficiently deal with the sewage of the place, estimated at 1200 gallons per day. Inasmuch, however, as the outlet of the filter would be at the top, and thus prevent any arrangement for automatically emptying it, I am uncertain as to whether it is absolutely necessary for its efficiency that constant and continual rest should be given each filter, turn by turn, or whether a periodical rest of every alternate week would be sufficient to secure a good effluent. The difficulties are enhanced by the close proximity of the river, which is affected at the proposed outfall by most tides, but not by all."

Answer.—The scheme proposed by our correspondent, of passing the sewage over the surface of material intended, if we understand him properly, to serve as a filter, is impracticable, and would result in failure. If a filter is intended to serve the purpose for which it is constructed, namely, to purify sewage, it must be provided with means of drainage from the bottom. Therefore, if this cannot be carried out, it is useless to construct it. Biological filters should be worked with intelligence. The sewage must be applied for a few hours at a time only, or at the longest not more than a day, and should be followed with a rest period equal to the period at which it has been under work. If this principle be not followed out, the filter will in a very short space of time become choked up, which can only be remedied by giving it a

very prolonged period of rest. It should always be borne in mind that biological filters must be looked upon as an evolution of the system of land filtration, and that, by a process of selection of suitable material, a filtrant of several feet in depth can be made to do higher duty than is possible in natural soil, which has often a filtrant of only a few inches in depth. In each case, however, it is to be understood that purification is effected by biological agency. It appears to us that, under the circumstances named by our correspondent, the septic tank process would probably be best suited to the requirements, as this system requires very little fall, and the tank may be constructed underground, without detriment, while the biological filters, which are used in conjunction with the septic tank, may be constructed only a few inches in depth.

1044.—Water Main in Connection with Sewer: Danger of Pollution from.—"Subscriber" writes:—"In a certain town several of the sewers are flushed by means of a sluice attached to the water main. The pressure thus obtained proves a most effectual means of flushing. But the question has been raised as to the possibility of sewer gas entering the main, and thus proving a source of contamination to the water supply. Of course, if the sluice is not properly closed such might be the case, but is there any danger during the time the sluice is open and the flushing in operation? I would further ask if this practice of flushing from the main is an isolated one, or is it general in other towns?"

Answer.—If we understand our correspondent properly, the water main is connected directly into a manhole or some part of the sewer, and a sluice valve is provided closely contiguous to the sewer, which is not trapped off from the water main in any way. Such a system is very objectionable, and is liable to cause pollution of the water in the street mains. There is not so much danger of pollution when the mains are under pressure, and while flushing is being carried out, but it is when the water is turned off at the main, for repairs or any other cause, that danger is to be apprehended. It rarely happens that sluice valves are in perfect working order so as to exclude leakage. When, therefore, the water is turned off at the main, a partial vacuum is formed in the pipes and air is drawn, or more properly forced into them, and at such times sewer air will find a ready means of access through the imperfect sluice valve, and mix with the water for general distribution when the supply is again turned on. We are not aware of any other instance than that named by our correspondent where the sewers are in direct communication with the water mains. There would be little objection to the supply being led into a flushing tank such as those used in conjunction with Rogers', Field's, Miller's, or Adam's flushing syphons, as in such cases the water service is disconnected from the sewer by means of a water-trap in the flushing tank.

1045.—Sanitary Institute Examinations: Dates of.—"G. W." writes:—"Will you be good enough to inform me what are the dates of the forthcoming Examinations of the Sanitary Institute?"

Answer.—From the calendar of the Sanitary Institute, which is issued quarterly, the following dates for examinations in Practical Sanitary Science and for Inspectors of Nuisances are, we find at present, fixed, viz.:—London, May 6th and 7th; Leeds, June 10th and 11th; Belfast, June 24th and 25th; Cardiff, July 8th and 9th; Liverpool, July 29th and 30th. Additional particulars may be obtained from the Secretary, The Sanitary Institute, Parkes Museum, Margaret-street, London, W.

1046.—Building Bye-laws: Power of Local Authority to Disapprove Plans.—"A. S. I." writes:—"I prepared a complete set of drawings and tracings for additions and alterations to an hotel in this neighbourhood, and submitted same to the District Council for approval, which were on three sheets, viz., ground plan and first-floor plans on one sheet, sections on another, and block plan on the third sheet. I marked all drains and connections in full. Excepting the block plan, which was drawn to a scale of 40ft. to the inch, the other plans were drawn to a scale of 8ft. to the inch. The Council have disapproved the plans, on the ground that all the plans and sections should be on one sheet. Query, (1) Can the Council require the several plans to be submitted on one sheet? (2) Can they object if I paste the plans on one sheet? (3) What is my best course to take in the matter? (4) Is there a book published giving full particulars on Building Bye-laws, and in relation to plans, &c.?"

Answer.—(1) If the plans are in conformity with the Bye-laws of the Council the latter are not enabled to refuse their approval on the grounds named by our correspondent. Neither is the Council enabled to require that plans must be submitted on one sheet as described. (2) No, if the plans are otherwise in conformity with the Bye-laws. (3) Assuming that the Bye-laws are complied with, the owner may proceed with the erection of the building, giving the usual notice of date of commencement to construct the building, at the expiration of one month from the date when the plans were first deposited. If there is no infringement of the Bye-laws the Local Authority cannot interfere, seeing that he has deposited the necessary plans. (4) Knight's "Annotated Edition of the Model Bye-laws," price 12s. 6d., obtainable of the Sanitary Publishing Company, post free, will probably be found very helpful to our correspondent.

1047.—Nuisance Caused by Offensive Trade: Procedure.—"Variola" writes:—"A man is in the habit of bringing dead horses and cows, dropped calves, &c., on to premises within this borough, and there cutting them up, and removing hide, bones, and offal to different places for sale. The surrounding inhabitants complain of the abominable smells. I have no evidence of his ever slaughtering or killing an animal there—in fact, the evidence is strong the other way. The Town Clerk says, in the absence of that evidence we cannot take up a case for using an unlicensed place as a knacker's yard or slaughterhouse, and asks me to take the case under some other Act. I would like to know what other Act we can proceed under. I have pointed out that I think it worth while trying the case under the Towns Improvement Clauses Act and Knackers Acts, for it is not the actual slaughtering or taking away the life of the beast which causes annoyance, but the subsequent cutting up, boning, and removal of offal."

Answer.—We should not advise that proceedings be taken for keeping an unlicensed slaughter-house, nor for keeping an unlicensed knacker's yard, as there is no proof that animals are slaughtered in the yard. Inasmuch as a "knacker" is held to be a person who slaughters horses, we think it could not be held that the premises are used for the purposes of a knacker's yard, for which a licence is required under the Knackers Act, 1786, and which licence is obtainable from a District Council under Sec. 27 of the Local Government Act, 1894. Proceedings may, however, be taken under Sec. 114 of the Public Health Act, 1875, against the occupier. Under this section it is provided that where any "building or place used for any trade, business, process, or manufacture causing effluvia is certified to any Urban Authority by their Medical Officer of Health, or by any two legally qualified medical practitioners, or by any ten inhabitants of the district of such Urban Authority to be a nuisance or injurious to the health of any inhabitants of the district, such Urban Authority shall direct complaint to be made before a justice," &c. It may be observed that if the effluvia amount to a nuisance in the sense of causing annoyance and discomfort, it is sufficient to bring the trade within this section, without providing also that injury to health results from such effluvia. See Malton Board of Health *v.* Malton Farmers' Manure Company, 40 L.T. (N.S.), 755; 44 J.P., 155. In Houldershaw *v.* Martin, 49 J.P., 179; 1 T.L.R., 323, it

was held that the Medical Officer's certificate under this section was sufficient, though it stated simply that a fried-fish shop was a nuisance, and did not further state that it was injurious to health. It has also to be observed that the Local Authority, on receipt of the certificates named, have no alternative but to proceed against the person causing the nuisance, the words of the section being imperative.

1048.—Sale of Food and Drugs Acts: Query No. 1037.—"T. W." writes:—"May I draw your attention to an error which appears in the answer to this query (No. 1037) in your issue of April 15th, where it states: 'It is also provided by Sec. 13 *of the Public Health Act*, 1875.' Should this not be read as 'by Sec. 13 of the Sale of Food and Drugs Act, 1875?"

Answer.—We are very much obliged to our correspondent for drawing attention to the error, which is obviously a clerical one. Sec. 13 of the Sale of Food and Drugs Act, 1875, as will be seen from the context, is meant, and Query No. 1037 must be read subject to this correction.

1049.—Sewer in Bed of Stream.—"H." writes:—"It is intended to purify a stream by providing an intercepting sewer to catch all sewage drains now discharging into it. Owing to a number of obstacles on the banks of the stream, it is thought advisable to put the intercepting sewer below the bed of the stream. Will you please inform me (1) if there is any objection to such a course? (2) What depth should the sewer be laid below the bed of the stream? (3) What is the best method of jointing earthenware pipes, so as to exclude water from the stream getting into the new sewer? (4) What is the best means of connecting the branch drains to the sewer under such circumstances?"

Answer.—(1) Beyond the patent fact that the construction of a sewer under the bed of a stream is, especially where there is much volume of water, somewhat costly, there is no objection, when proper precautions are taken to ensure sound construction, to such a course. (2) The depth at which the sewer is to be laid must depend upon local circumstances, and also upon the material to be used in the construction of the sewer. If an iron pipe sewer be constructed, the crown of this may be level with the bed of the stream, providing this bed is not of a shifting character. On the other hand, if stoneware pipes are to be used, they must be embedded in cement concrete of a thickness equal to the diameter of the sewer, and the upper part of the concrete should preferably be kept slightly below the bed of the stream. (3) Providing the sewer can be laid so that, while laying, the trenches are free from water, ordinary cement joints may be used. Otherwise special joints, such as Sykes' patent joint or Hassall's patent joint, should be used. In any case, however, the pipes must be protected by concrete in addition. (4) The branch drains will be most conveniently connected by the use of Sykes' patent screw joint, and screw stoppers may be inserted in the junctions until the branch drains are ready for connection. The manufacturers of the Sykes patent joint pipes are the Albion Clay Company, 18, New Bridge-street, London, E.C.

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It is needless to say that these statements are absolutely devoid of a particle of truth, and any person who will enable the Company to secure a conviction against anyone making this statement will receive the above reward.

MARTIN & NICHOLSON (Solicitors),
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April, 1898.

Contracts Open.

The dates given below are the latest up to which tenders can be received.

ADLINGTON (LANCS.). — April 25th. — Pipes and Gullies. — Mr. Thomas Farnworth, Council Offices, Adlington, Lancashire.

BURY (LANCS.).—April 25th.—Sanitary Tubes, &c.—Mr. J. Cartwright, M.I.C.E., borough engineer.

SOUTH WEALD (BILLERICAY, ESSEX).—April 25th.—Drain.—Mr. G. Lapwoods, Tower-hill, Brentwood.

WATERFORD.—April 25th.—Sewer Pipes, &c.—Mr. James J. Feeley, town clerk, Town Hall, Waterford.

ANNFIELD PLAIN.—April 26th.—Sewer.—Mr. T. J. Trowsdale, surveyor, Annfield Plain.

BARNOLDSWICK. — April 26th. — Scavenging. — Mr. Charles Thornton, clerk, Nelson.

BURTON-UPON-TRENT. — April 26th.—Sewers, &c.—Mr. George T. Lynam, borough engineer, Burton-on-Trent.

KNOTTINGLEY.—April 26th.—Sewerage Works—Extension of Time.—Mr. John Richardson, M.I.C.E., engineer to the Council, 5, Central Bank Chambers, Leeds.

EGREMONT (CHESHIRE).—April 26th.—Sewers.—Mr. W. H. Travers, Public Offices, Church-street, Egremont, Cheshire.

STAPLEFORD AND SHARDLOW. — April 27th. — Sewerage Works.—Mr. W. H. Radford, C.E., Angel-row, Nottingham.

HASLEMERE (SURREY). — April 27th. — Sewerage Works.—Messrs. R. B. Grantham and Son, 23, Northumberland Avenue, London, W.C.

BARNSTAPLE.—April 30th.—Sewer.—Mr. Jas. Bosson, town clerk, Municipal Buildings, Barnstaple.

STALYBRIDGE.—May 2nd.—Sewers, &c.—Mr. J. N. White, Town Hall, Stalybridge.

Vacancies.

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CLERK OF WORKS (BARNSTAPLE, April 30th).—For the Town Council. Mr. James Bosson, town clerk, Municipal Buildings, Barnstaple.

CLERK OF WORKS (LONDON, S.W., April 28th).—For the London County Council. Salary £4 4s. a week. Forms of application can be obtained at the offices, Spring-gardens, S.W. Clerk of the London County Council, Spring-gardens, S.W.

CLERK OF WORKS (SOUTHAMPTON, April 27th).—For the Corporation. Salary £3 3s. per week. Mr. George. B. Nalder, town clerk, Municipal Offices, Southampton.

DRAUGHTSMAN (LONDON, S.W., April 25th).—For the London County Council. Salary £3 a week. Application forms to be obtained from the offices, Spring-gardens, S.W.

ENGINEER (LONDONDERRY, May 3rd). — For the Corporation. Sir R. Newman Chambers, town clerk, Guildhall, Londonderry.

INSPECTOR OF NUISANCES (STROUD, April 30th).—For the Urban District Council. Salary £100 per annum. Mr. Percy Witchell, clerk, Stroud.

SURVEYOR AND INSPECTOR OF NUISANCES, &c. (HAYWARDS HEATH, SUSSEX, April 26th) —For the Urban District Council. Salaries will be £70 per annum as Surveyor and £40 as Inspector of Nuisances. Mr. Edward Waugh, clerk, Haywards Heath.

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ARTICLE No. 5.

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Caffeine has the property of increasing the action of the heart, as well as of acting on the kidneys. It thus increases the current of blood to the jaded brain as well as to the extremities, and communicates a feeling of well-being. By its action on the kidneys it also removes the waste products of muscular exertion and other substances, which tend to cause a feeling of dulness and inertness if retained in the blood. Cocoa does not contain caffeine, but only theobromine. But although tea and coffee both contain caffeine, they also contain small quantities of other bodies, which in some individuals produce unpleasant symptoms. Thus Ceylon and Indian tea is apt to cause (much more than China tea) a feeling of nervousness, or even indigestion, and a wakefulness that is very distressing, especially if taken late in the evening. Coffee also in some people causes costiveness, and in others the reverse.

Kola nuts, or kola beans, as they are sometimes called, are the seeds of a West African tree belonging to the same family as cocoa, but differ from cocoa in containing caffeine, and are free from any injurious ingredient whatever. The idea therefore occurred to Dr. Tibbles of adding kola to cocoa, and thus adding caffeine to it, so as to confer on it the advantages of tea and coffee without their disadvantages. Recognising also the value of malt and hops in the national drinks, ale and beer, and the fact that teetotallers are a very large and increasing body, he conceived the notion of adding these ingredients to cocoa, and of thus making a palatable, invigorating, "grateful and comforting" drink that should embrace the flavour of cocoa, the restorative properties of tea, the tonic and sedative properties of the hop, and the digestive properties of malt.

Malt and hops are too well known, both to the public and to the medical profession to need recommendation. The enormous amount of malt extract that has been prescribed of late years indicates the value of malt, quite apart from the alcohol with which it is associated in ale.

The difference in the stimulant action of caffeine and alcohol is very remarkable. Alcohol by dilating the minute vessels of the skin and by thus producing a flow of blood to the surface, causes a sensation of temporary warmth to be experienced, but it has the disadvantage of dulling the intellect. Caffeine, on the other hand, increases the pumping power of the heart, and so causes a healthy flow of blood to every part, stimulating the brain, causing a renewed feeling of vigour and alertness.

Anyone who has experienced the difference between the effects of a cup of strong coffee and a glass of whisky and water during a long railway journey on a cold day will recognise the truth that coffee produces a more permanent warmth than alcohol.

Although kola contains caffeine (as well as theobromine, the active principle of cocoa) it has no aroma of its own. By mixing it with cocoa, therefore, the physiological advantages of tea and coffee are added to the cocoa. Kola also contains starch, which, when rendered soluble by the ferments of the saliva and pancreas is a true food.

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NOTICES.

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THE

Sanitary Record,

APRIL 29, 1898.

Notes.

Sewage Purification: Manchester Report.

THE Report of a Special Committee of the City Council of Manchester, which was appointed to visit various towns in the kingdom, and to report upon the best method of dealing with the Manchester sewage, is of such a valuable character to all who are interested in the question of sewage disposal, that we propose publishing it in the columns of THE SANITARY RECORD. The deputation visited ten towns, accompanied by the City

Surveyor and City Chemist, and inspected the sewage works for themselves, so that they might form an unbiassed and proper opinion of the merits and demerits of the systems of sewage treatment in operation. They were also furnished with reports as to their cost and general working by the City Surveyor, and also in regard to the chemical side of the subject, by the City Chemist: the result being that a report has been compiled which may rank as one of the ablest and most reliable of its kind dealing with the most recent methods of sewage purification. It may be useful at the present moment to observe that the Sub-Committee state, in concluding their report, that they "agree that of all the methods of artificial filtration that nearest to natural action and most reasonably practicable and available for adoption is the biological filter or bacteria bed, such as may be seen in operation at many of the places visited." The Report will be published in a series of chapters, the first of which will appear next week.

Drug Adulteration.

One of the most difficult Acts of Parliament that Local Authorities have to administer is that dealing with the adulteration of food and other products. In some parts its provisions are so unpopular that it has never been adopted, or if adopted, it has remained practically a "dead letter." Especially does this appear to be the case with regard to drugs. No article lends itself so kindly to adulteration, and it is well known that the opportunities for deception are largely taken advantage of; yet very few prosecutions take place, nor do we think their number is likely to be increased if the decisions given by magistrates are similar to those recently arrived at in Sunderland. Analysis having been made of numerous samples of drugs at the instance of the officers of the Health Department, with the result that several clear cases of adulteration were revealed, summonses were taken out against the various offending parties.

Nominal Fines.

It may be interesting to show the groundwork for the prosecution. In four cases "Gregory's Powder" was found to be prepared with carbonate of magnesia instead of oxide of magnesia, as laid down by the "British Pharmacopœia." In another case, a sample of the same powder contained 17·49 per cent. of carbonate of lime. With regard to this case a singular deliverance was made by the Bench. It patronisingly told the Corporation it "was quite right to take proceedings," and the inference drawn by many is that in the others "right" was not on the side of the Corporation. Further, in two instances, sublimed sulphur was supplied instead of precipitated sulphur; in other two, the same drug being asked for, the packets supplied contained 7·77 per cent., and 62·17 per cent. of hydrated sulphate of lime respectively. The truth of these analyses was not disputed, and it was clearly demonstrated that there was a difference of 50 per cent. in the value of the articles sold and what they were represented to be. But in every case the fine inflicted was only 1s., and that without costs.

Inciting to Adulterate.

If ever there was an instance of inciting tradesmen to commit fraud, we think it is supplied in the cases before us. The whole tone of the magistrate's remarks seem to imply that the summonses were an act of "persecution" on the part of the Health Committee, instead of the carrying out of a public duty. Our surprise at the result is increased by the fact that on the bench was one of the leading practitioners of the town. We wonder what he would say if he prescribed magnesia for a patient and the chemist supplied "carbonate of magnesia" as the genuine article. We learn, also, that the Sale of Food and Drugs Acts have been until lately almost entirely neglected in Sunderland, and the recent decisions are not likely to encourage further action on the part of the members of the Health Committee who are desirous of seeing the Acts properly enforced. In fact, the impression has already got abroad that a chemist "may supply whatever he likes," provided the substance sold is not "rank poison."

Southwark Once Again.

The enlightened Vestry of St. George the Martyr, Southwark, is determined to distinguish itself, and promises ere long to become the exemplar in the metropolis of the axiom "How *not* to do it." It seems an utter impossibility for this Vestry to conduct its affairs in a business-like manner, and we pity the feelings of any intelligent ratepayer, as he reads the reports in the local papers of the undignified proceedings taking place at the regular meetings of the Vestry. This, however, is by the way. But really it is time the attention of the Local Government Board should be drawn to the continual shelving of the complaints and recommendations of the Medical and other Officers. For instance, at the last meeting one of the members directed attention to the unsatisfactory condition of affairs in the crypt of the parish church. Constant complaints were being made that a very unpleasant effluvia arose from this portion of the building, caused no doubt by the decaying bodies deposited therein.

"A Danger to Public Health," but "it's of no consequence!"

Confirmatory evidence was also given by others, the rector stating that more than one member of his congregation had called his attention to the nuisance, especially when the wind was blowing in a particular direction; and he had personally sought the advice of the Medical Officer. The Vestry was asked to refer the complaint to the Public Health Committee; but a representative of that body stated it had already been considered, and it was not thought necessary to take any action. The Vestry endorsed this view. Dr. Waldo, the Medical Officer of Health, wished to make a statement, but was promptly silenced by the chairman. So the stench may continue, children and adults may inhale the poisonous fumes, disease may be disseminated broadcast, but for some occult reason it matters not to these representatives (!!) of the people—"it's of no consequence" to them. If this is the position they take up, then they must be taught that public affairs cannot be allowed to be administered in that slipshod fashion. The Vestry is, or should

be, the guardian of the public health, and if its attention is called to a supposed nuisance, the least it can do is to inquire into the matter and see if there is any foundation for the complaint. But what the Vestry has declined to do to-day it will be compelled to do to-morrow. We respectfully beg to call the attention of the Medical Officers of the Local Government Board to this intolerable nuisance, and urge them to send the Inspector of Burial Grounds to investigate for himself. After such a visit the Vestry may deem it wise not to wait for the report, but order either the blocking up of the crypt or the removal of the human remains to a place where they will be less dangerous to the inhabitants of the district.

Another Public Officer.

Very soon the new Workmen's Compensation Act, passed last session, will come into operation, and with it we have the establishment of a new public office to be held by medical men. An official notice has been issued to the effect that the Home Secretary proposes shortly to proceed to appoint a number of "Medical Referees," whose principal duty will be to act as the advisers in medical matters of the Committees, Arbitrators, and County Court Judges, who are empowered to decide all questions arising in proceedings under the Act. For this duty they will be paid by the Treasury, and a scale of fees has already been approved. The appointments will be made according to the County Court circuits, Referees being appointed for each of the fifty-five Circuits into which England and Wales are divided. The Secretary of State, who has had the advice both of County Court Judges and of high Medical Authorities, deems it essential that the Referees should be men of independent position and high standing in their profession. Other things being equal, preference would therefore be given to those holding important hospital appointments, or having had other special opportunities of gaining wide experience of accidents and their consequences; and to those who are not closely identified, by the nature of their practice or otherwise, with the classes affected by the Act. Applications for the appointments should be addressed to the Home Secretary.

The Vaccination Bill.

The Vaccination Bill came up for second reading in the House of Commons on the 19th inst.; but though Mr. Chaplin urged the House to push through that stage during the sitting, the debate was adjourned. It cannot be said that the discussion threw much new light on the question. The speeches of Sir Walter Forster and Sir William Priestley, however, were of interest, as anything they have to say on a subject like this is always sure to command a respectful hearing. It goes without saying that they were both strongly in favour of the measure, though they subjected it to some criticism in points of detail. The statistics quoted by Sir Walter Forster should have been sufficient to dispel the fixed idea in the minds of the opponents of the Bill as to the extent of the danger attendant on the practice of vaccination. He pointed out that in England and Wales the proportion of deaths traceable to this cause to the total number of vaccinations was one in 14,159, while in Scotland it was only one in 38,872; the low proportion for Scotland being probably due to the age limit there being six months, when the operation can be performed with greater safety.

Domiciliary Vaccination and Vaccinating Stations.

It was fully recognised in the debate that the domiciliary vaccination provided for by the Bill, in accordance with the Scotch system, would prove very beneficial; for among other advantages may be mentioned this one, that it will save the risk of aggregating a large number of children in the vaccination-room, and diminish the chance of septic germs affecting the vaccination. At the same time the hope was expressed that the Local Government Board would not do away with vaccinating stations, under such conditions as might be necessary to prevent infection. Mr. Chaplin accordingly assured the House that stational vaccination would not necessarily be abandoned—it would only cease to be compulsory; and he pointed out that there was nothing in the Bill to prevent Boards of Guardians continuing to make use of stational vaccination, if they found it was preferred, or in the case of persons desiring re-vaccination when there was an epidemic of small-pox.

The Extension of the Age-limit.

It has already been pointed out in these columns that the extension of the age-limit may very probably result in an increase in the number of "unaccounted-for cases." Under the existing state of things about 10 per cent. of the children in Birmingham, for example, escape vaccination owing to removals before they are three months old; and Sir Walter Forster thought that if the age should be extended to twelve months, as proposed by the Bill, the proportion might very possibly reach 50 per cent. Still he believed that the advantages of vaccination at a later age than at present were so great as to justify the extension of the age. But the suggestion was made that it would be well to make the age the same as in Scotland, viz., six months, as there was little reason why there should be a difference in practice in this respect in different parts of the country. Mr. Chaplin, however, defended the age fixed by the Bill, on the ground that in some rural districts the vaccinating stations were only attended half-yearly, and in such cases to make the age six months would practically involve a considerable curtailment of the age-limit. We are not clear that this argument is sufficiently cogent to outweigh the considerations in favour of assimilation of practice, especially as the six months age is advocated by the leading medical authorities. That is the limit favoured by the Incorporated Society of Medical Officers of Health, than whom there can be no more competent judges.

Some Suggested Amendments of the Bill.

The leading points of criticism advanced by Sir William Priestley and Sir Walter Forster are, indeed, all to be found in the resolutions adopted by the Incorporated Society at the conference reported by us last week, and probably

some of them will be brought forward again at the Committee stage and embodied in the measure. One of them relates to the admission of unvaccinated children to school. In Germany, such children have to be vaccinated, and evidence of efficient vaccination must be produced before they will be admitted to a public elementary school, and it is thought that we might, with advantage, adopt a similar precaution. A more important point still relates to the question of administration. Sir William Priestley urged that as the Boards of Guardians had not satisfactorily performed their duties in the past, the administration of the law should be transferred to the Sanitary Authorities. The expediency of this reform, which is also endorsed by the Society of Medical Officers, is so obvious that we wonder that it was not made a leading point of the Government Bill. Perhaps it was on account of anticipated opposition, for though Mr. Chaplin did not refer to the point in his speech, we note that with regard to certain other reforms, which he confessed to be in themselves desirable (such as re-vaccination) he maintained the impracticability of including them in the scope of the Bill if it was to pass into law this session.

The Opposition to the Measure.

Part of Sir William Priestley's speech was devoted to a vindication of the efficacy of vaccination, which he felt to be necessary in view of the prejudiced character of the opposition to the Bill. And yet, if we read the speeches of the opponents, we cannot but be struck with the singular lack of argument shown in them. It was said that "vaccination was wrong in principle and bad in practice;" and also that the decrease of small-pox was rather due to the great change effected by the general public health law, than to the compulsory vaccination of children. But for these statements not a vestige of authority was produced; whereas Sir William Priestley, speaking as an expert, maintained that if any scientific fact was ascertained beyond all reasonable doubt, it was the potency of vaccination to prevent small-pox. He classed the antagonism to vaccination along with the misguided ignorance of those who have opposed sanitary reforms in all times and in all parts of the world, and said that it was a public calamity when such ignorant and factious opposition succeeded in thwarting the teachings of science. It was a weighty indictment, and will not be liked by the anti-vaccinators. We wonder what answer they can make to the hard fact stated by Mr. Monk, member for Gloucester, that during the small-pox epidemic in that town the mortality was only 10 per cent. among vaccinated people, and 40·8 per cent. among those who had not been vaccinated.

The Plague in India.

There has recently been a singular falling off in the telegraphic reports regarding the progress of the plague in India. One might infer from this that "no news is good news," for if the mortality continued to be very alarming, or if the sanitary measures of the Plague Committee were giving rise to a renewal of the popular disturbances, we should be certain to hear about it. And yet we understand that the aspect of affairs in Bombay is still sufficiently grave. The plague is still rampant, and but for strong military precautions the ugly head of riot would again show itself. The white population, too, consider that the Authorities have made far too many concessions to native prejudice—concessions which, while not appeasing the malcontents, have materially increased the risk of the plague spreading from the native quarters to the British part of the town. In striking contrast with these gloomy reports, it gives us pleasure to observe that in Poona the native community have come round to see the real blessings that have attended the efforts of the British to suppress the plague, and have publicly testified their appreciation and gratitude for the success which has attended these efforts.

"Sanitation in the British Mercantile Marine."

The publication of a little book under the above title should direct notice to a subject which, we fear, does not receive, even from sanitarians, the attention that its importance deserves. In the great ocean liners the passengers and the superior officers at least have no reason to complain of lack of attention to their well-being and comfort, but how far can the same be said of the crew? And in the smaller class of trading vessels, the accommodation for the men must often be far too scanty and cramped to be thoroughly healthy. Deficiency in ventilation, and the other sanitary requirements in the sleeping quarters of the crew will not, of course, be felt so much by a seaman, whose life is passed almost entirely in the open, and under the invigorating influences of the sea breezes, but the lot of stokers, firemen, and engineers who are confined during the day to the engine-room and the stokehold, is a harder one. The author of this work, Mr. W. G. Romeril, Sanitary Inspector for the Port of London, speaks from the point of view of a wide personal experience, and an intimate practical knowledge of the subject, and he is able to show that in these respects there is great room for improvement in the sanitation of our ships. The chief sanitary deficiencies—including excessive heat and limited ventilation—exist in the lower quarters of a vessel devoted to the engineers and their subordinates, and the conditions under which they have to work are often productive of nervous exhaustion and other ills, that have a very serious tendency to shorten the lives of the men so engaged. Such conditions are perhaps to a certain extent inseparable from the nature of their work, but there is little doubt that they are capable of amelioration.

Electric lighting, says the *Daily News*, is proving a successful business in the hands of the St. Pancras Vestry. The profit on the last year's working has sufficed not only to wipe out a deficit of £800 on the previous year's accounts but to provide a balance in hand of £5717. This gives electric current consumers a lively expectation of reduction in the price, which for lighting purposes s at present 6d. per Board of Trade unit.

LIME, MORTAR, AND CEMENT: THEIR COMPOSITION AND ANALYSES.

By W. J. DIBDIN, F.I.C., F.C.S., &c.

CHAPTER I.

CHARACTERISTICS OF VARIOUS LIMES.

Chemically speaking, pure lime is an oxide of calcium. It is white, caustic, and soluble in water to the extent of 11 grains in a pint, or 88 grains per gallon. It combines with carbonic acid to form carbonate of lime, which is familiar to us in an impure state in the form of chalk. The metal calcium is never met with in an uncombined state in nature, being always combined with other elements, and chiefly as carbonate. The "atomic" weight of the metal is forty, compared with hydrogen taken as unity. In its pure state it is yellow, harder than lead, ductile, and malleable. It combines with oxygen slowly in dry air, more rapidly in the presence of moisture, and must be preserved out of contact with air. When heated in air to a bright red heat it melts and ignites, burning with a bright white light, and forming the oxide of calcium. It is this calcium oxide which is the pure substance of our inquiry, and, as may be supposed, it is never obtained absolutely pure in commerce—in fact, for the purpose of making mortar and cement it would be but of little use unless it was combined with other materials, such as silica, iron, and alumina.

In the form of carbonate, calcium oxide, or lime, as it is generally known, constitutes some of the most common minerals and rocks, viz., arragonite, calc-spar, chalk, limestone, marble. It is a constituent of dolomite, which is a compound of carbonate of lime and carbonate of magnesia, having the composition $Ca\ Co_3\ Mg\ Co_3$. Lime also occurs in anhydrite ($Ca\ So_4$), and in gypsum, or alabaster, and in selenite ($Ca\ So_4,\ 2\ H_2O$); as fluoride, in fluorspar ($Ca\ F_2$); as phosphate in apatite [$Ca\ F_2,\ 3\ Ca_3\ (PO_4)_2$]; and as silicate it is widely diffused in different minerals. Many of the salts of lime are normal constituents of soils, of plants, and of the animal body; egg shells, coral, and the shells of the mollusca consist chiefly of calcium carbonate, whilst bones consist chiefly of calcium phosphate. The carbonate (held in solution by free carbonic anhydride, better known as carbonic acid) and the sulphate are also normal constituents of natural waters, and causing, with the magnesia and other salts, the property known as hardness.

If a fragment of marble, which is practically pure carbonate of lime, be heated in such a manner that the carbonic acid set free can escape, a white substance will be obtained, which is the oxide of calcium, or quicklime, having the composition, chemically expressed, of CaO, thereby indicating the combination of one atom of calcium with one atom of oxygen, and this compound has an "atomic" weight of 56, being 40 for the calcium and 16 for the oxygen. Its specific gravity is 3·08, water being taken as unity.

This white, amorphous solid attracts water and carbonic acid from the air, and under favourable conditions combines with great energy and much evolution of heat with water, forming calcium hydroxide, $CaO + H_2O = Ca\ H_2\ O_2$. When water is poured upon a mass of quicklime, the latte swells up, cracks, and emits steam, and finally fall into an impalpable powder. The purer and fresher the lime the more rapidly does this phenomenon occur. In this condition the lime is known as "slaked." If an excess of water has not been employed, the powder is to all appearance dry, and is far finer than the unslaked lime can be obtained by any process of grinding. When in the course of time the lime again combines with carbonic acid by absorbing it from the atmosphere, it necessarily parts with the water so taken up, the carbonic acid replacing it, thus $Ca\ H_2\ O_2 + CO_2 = Ca\ CO_3 + H_2O$. This action is the cause of the efflorescence in brickwork known as "saltpetreing," which will be referred to later on. The water thus displaced dissolves other salts, the solution thus formed finding its way to the surface of the work, there evaporates, leaving the crystallised salt as a crust on the surface of the wall. From this observation it will be seen that lime, considered as a chemical substance, is a very definite body, having characteristics peculiar to itself, and that these characteristics are the same wherever the lime may have been obtained. It is when we come to consider the actual properties of the various limes obtained in commerce that certain very specific characters are brought into play, and it is these which we have to consider in relation to the adaptability of the commercial lime for certain uses. Thus the lime most suitable for making mortar is by no means the best for making lime-water in large quantities, or for the purpose of the gas manufacturer in purifying his gas. These differences, it will be seen, are due to certain substances—or impurities, strictly speaking—which affect the quality of the mixture.

The following table of analyses of various limestones, &c., will serve to indicate the differences in character of the raw material before it is converted into lime by being burnt in the kiln. First of all, it is to be noted that the various limestones may be classified under four heads, viz.:—(1) Fat or pure limes; (2) poor limes; (3) hydraulic limes; (4) cements, natural and artificial. As it will be seen, these classes merge gradually into one another, and it is difficult to draw a sharp line of demarcation in many cases, therefore we have "good" and "bad" limes, according to the purpose for which they are intended. Many of these analyses have been confirmed by the writer from time to time, and may be accepted as forming an accurate sequence of results representative of the limes in question.

From this table it will be seen that the hydraulic character of the lime is due to the presence of certain impurities, viz., silica, iron, and alumina, which are included in some of the analyses under the head of "clay"; and that as these increase in quantity up to the extent of about 30 per cent. the "hydraulicity," as it is called, of the lime produced by the burning of the stone is increased.

It will now be seen how important it is that the use to which the lime is to be put should be first considered before a purchase is made. Thus, if the lime is required for use in a gasworks, &c., where the chemical activity of the lime is of the first importance, it should be as pure as possible, and therefore "fat" limes should be obtained. If, on the other hand, the lime is required for mortar making, good hydraulic lime should be

ANALYSES OF VARIOUS LIMESTONES.

Composition stated in Percentages.

Name of limestone.	Carbonate of lime.	Carbonate of magnesia.	Silica.	Iron and alumina.	Water and loss.	Authority.
Fat Limes.						
Marble	100	—	—	—	—	
White chalk	98·6	0·4	—	1·0	—	Schweitzer
Bath oolite	94·5	2·5	—	1·2	1·8	Daniel & Wheatstone
Portland oolite	95·2	1·2	1·2	0·5	1·9	Daniel & Wheatstone
Poor Limes.						
Siliciferous oolite, Chilmark stone	70·0	3·7	10·4	2·0	4·2	Daniel & Wheatstone
Feebly Hydraulic.						
Grey chalk, Halling	92·0	—	8·0 clay		—	Scott
Hydraulic.						
Bolsover dolomite	51·1	40·2	3·6	1·8	3·3	Daniel & Wheatstone
Carboniferous	86·2	—	11·2 clay		2·6	Phillips
Grey chalk, Sussex	83·0	—	17·0 clay		—	Scott
Strongly Hydraulic.						
Blue lias, Lyme Regis	79·2	—	17·3 clay		3·5	Reid
Carboniferous, Welsh	71·5	1·4	20·1	5·7	1·3	Muspratt
Arden, Glasgow	68·0	0·8	28·8 clay		2·4	Ingram

purchased. In the case of the manufacture of cement, the quality of the limestone employed must be considered in regard to the quantity of clay to be mixed with it to form the "slurry," from which the cement is manufactured. This point serves to indicate the importance of chemistry in regard to our manufactures. For years the English Medway cements were considered far superior to that of German manufacture, because the ingredients naturally to hand constituted the best materials for the purpose; but as soon as the German manufacturers studied the question from the chemical standpoint they were enabled to so choose their ingredients as to turn out cement equal to the best of the English makes.

It will be understood that when the limestones are burnt the relative proportions of lime, &c., vary by reason of the loss of carbonic acid driven off by the process. Thus, while the marble would show still 100 per cent. of pure lime, there being no impurity present, the white chalk would yield a lime having the composition of:—Lime, 55·2; magnesia, 0·2; silica, &c., 1·0 = 56·4; or, expressed in percentages, lime, 97·9; magnesia, 0·4; silica, &c., 1·7. In like manner the carboniferous limestone, having 86·2 per cent. of carbonate of lime, would, by the loss of carbonic acid, yield only 46·3 of lime to 11·2 of clay, the percentages being:—Lime, 81·2; clay, 18·8. It will be remembered, from what has been stated in the first part of the chapter, that each 100 parts of carbonate of lime yields, if thoroughly burnt, only 56 of lime, by reason of the loss of 44 parts of carbonic acid.

The following table of the result of properly burning all the above limestones will be of interest. In each case it is assumed that the "water and loss" shown in the foregoing table is eliminated.

Lime Produced by the Combustion of the Limestones in the above Table.

Percentage Composition.

Limestone.	Lime CaO.	Magnesia MgO.	Silica.	Iron and alumina.
Fat Limes.				
Marble	100	—	—	—
White chalk	97·9	0·4	1·7	traces
Bath oolite	95·6	2·2	—	2·2
Portland oolite	95·8	1·1	2·2	0·9
Poor Limes.				
Siliciferous oolite	73·4	3·4	19·5	3·7
Feebly Hydraulic.				
Grey chalk, Halling	86·6	—	clay	13·4
Hydraulic.				
Bolsover, dolomite	53·7	36·1	6·7	3·4
Carboniferous	81·2	—	clay	18·8
Grey chalk, Sussex	73·2	—	clay	26·8
Strongly Hydraulic.				
Blue lias, Lyme Regis	71·9	—	clay	28·1
Carboniferous, Welsh	60·2	1·0	30·3	8·5
Arden, Glasgow	56·6	0·6	clay	42·8

TO OUR READERS.

The Editor solicits the co-operation of readers in making The Sanitary Record *more attractive by means of pen-and-ink sketches, photographs, and diagrams. There are many phases of sanitary work which lend themselves admirably to illustration. By this means not only individual articles, but the journal as a whole will be brightened.*

THE SANITATION OF DOMESTIC BUILDINGS.

By Frank Latham, C.E., M. San. Inst., &c., Assistant Surveyor, Borough of Margate.

CHAPTER VII.

DRAIN TESTING.

All drains should be specially tested before being covered in, to prove them as being gas and water-tight. The neglect of this important measure is sure to lead to trouble. It is requisite also that these tests should be extended to the soil and ventilation pipes, not only to ascertain if there are any defects in the jointing, but also in the case of the latter as to their due working, as they are liable from some unseen cause to a reverse action, the inlet and outlet having exchanged functions. It is imperative, therefore, that all drains upon completion should be carefully and exhaustively tested, so that their condition may be ascertained without doubt, and in the event of faults in construction or material, they may be exposed and properly rectified.

With respect to drains which pass under, or near to dwelling-houses, the best and safest one is the hydraulic or water test, which is applied in the following manner.—The lowest part of the drain is plugged by the insertion of an india-rubber expansion stopper, such as Jones' (Figs. 86 and 87);

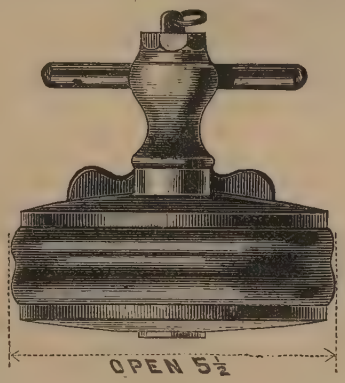


Fig. 86.

and after this has been done, the drain is filled with water until it runs into one of the gully traps at the highest level. Should the drain be perfect, the water will remain for some time at this level without lowering; but if a leakage or weakness exists, the water will either never reach this level, or, should it do so, will immediately begin to subside.

It is needful to remember that upon the drain being filled for the first time a certain quantity of water may be absorbed by the dry materials of the inspection chamber and pipe joints, &c., but the amount of water thus absorbed ought to be only a trifling quantity. Particular attention, however, should be paid to the external condition of the pipes and joints in order to detect any signs of sweating, this sweating proving that the pipes or joints are imperfect and unsuitable for their purpose.

In view of the severity of the water test, especially as regards drains with ordinary cemented joints, these joints should always be permitted to set firmly before the test is applied, otherwise there is the likelihood of the cement being washed out of the joints or otherwise disturbed, which upon setting will render the drain defective.

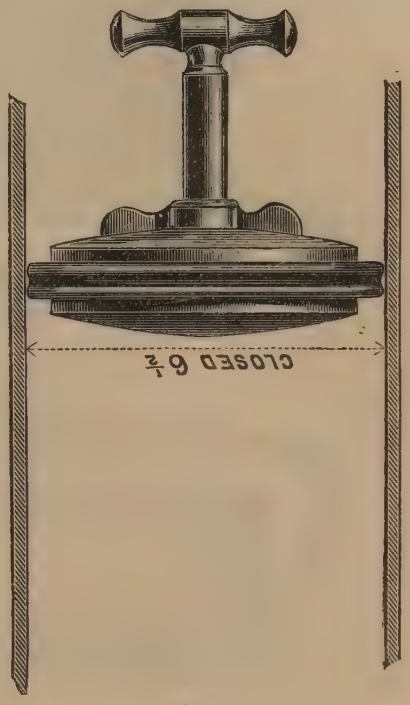


Fig. 87.

Ordinary socketed earthenware drains having a fall of over 5ft. should be tested in sections. The advantage and necessity in such cases of using patent composite jointed stoneware pipes, or iron pipes caulked with lead, will thus be plainly seen, the joints of these being perfect in resisting high pressures, in some instances the pipes having given out before the joints. Soil pipes and ventilators should also be sufficiently substantial to stand the water test, and in the case of the former it is essential that they be so tested. This can be easily and conveniently done by plugging the end of the soil pipe and flushing the water-closet. Where there is a second floor of water-closets using the same soil pipe the lowest closets should be plugged by means of a Jones' patent air stopper (Figs. 88 and 89 on next page).

A quick and fairly efficient test, very useful in most cases, and particularly valuable for old drains, is the smoke test, as the smoke will sometimes rise through the ground in the event of the defects existing in the drains, thus locating the position of the fault. This test is highly useful for correctly ascertaining the working of the ventilation pipes, the character of which is immediately disclosed after the drain has been filled with smoke. In applying the smoke test the open ends of the ventilators must be first closed, and the smoke admitted in a manner which will confine it to the drain. Should there be defects in the drain, or insufficient water seals to the traps, the smoke will make its escape, it being, as a rule, easily detected.

THE SANITATION OF DOMESTIC BUILDINGS.

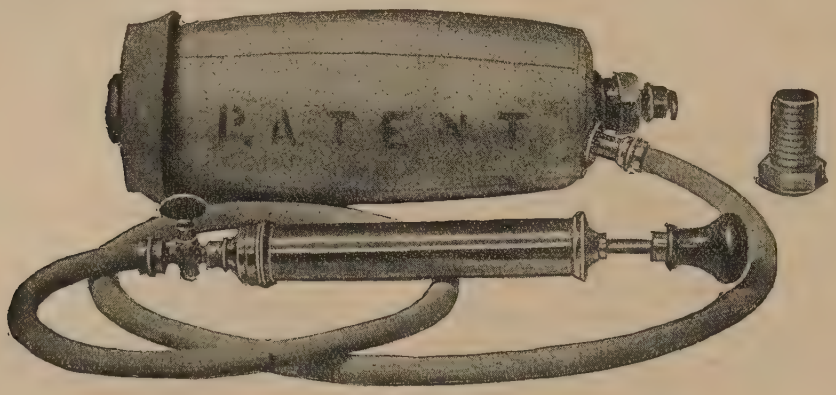


Fig. 88.

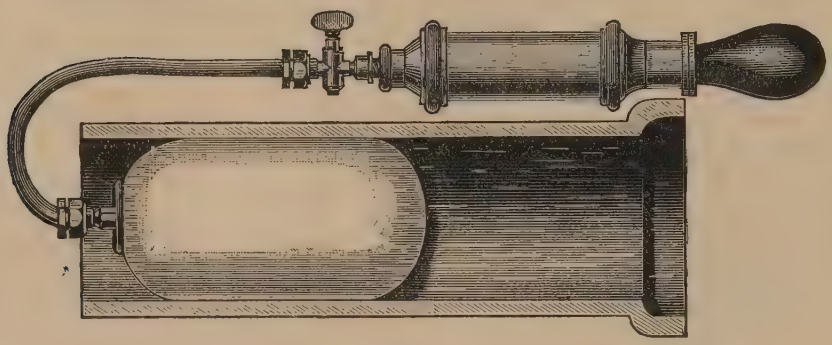


Fig. 89.

"PRACTICAL SMOKE PREVENTION."

By W. Nicholson, Smoke Inspector, Sheffield.

(*Continued from page* 423.)

After having briefly examined the many and various kinds of appliances which have been tried and are working to-day, we are compelled to conclude that much has been done in the shape of inventions to try and solve the question, and we may truthfully say of the manufacturers in general, they have been alive to the importance of the question, and have utilised their experience and tried all sorts of experiments to be able, if possible, to prevent smoke, for which the public is indebted to them. We are now confronted with the question, Is black smoke prevented as far as it is practicable to do so? To such a question we must reply in the negative. How, then, can

PRACTICAL SMOKE PREVENTION

be brought about? We understand by practical prevention, means and methods which will not interfere with the trade work required of the furnace, and the processes carried on therein; methods reasonable in cost, and within the reach of all and within the power of all to perform.

WHAT ARE THESE MEANS AND METHODS?

I. *Common-sense conditions of working.*—(*a*) Sufficient boiler power, and properly set; (*b*) flues large and chimney tall to obtain the desired draught; (*c*) knowledge of power required, and when required; (*d*) the top of the chimney must be seen from the firing hole.

II. *Firemen.*—In the past any man was considered suitable for a fireman if he could use a shovel and was strong in the arm, but now things have changed. All engineers agree that practical firing is an art and requires skill; in other words, the use of the head is needed as well as of hands. It is a very responsible position, because his own life and the lives of others are in his hands. Lack of knowledge, or a little negligence, might prove most disastrous.

(*a*) Teaching or training of firemen is necessary if black smoke is to be practically prevented, and engineers will have to pay more attention to the teaching of firemen.

(*b*) That heat is necessary to obtain complete combustion. Heat can be produced in the best and quickest way by light firing, a little coal on at a time, and firing often. By so doing the fires burn brightly, generate steam quickly, and make little or no black smoke, which prevents a nuisance and produces more steam per pound of coal, which means a slight saving.

(*c*) Side firing: We are all agreed that light firing is the very best kind of firing. There are many ways of firing lightly. Some fire in front, then push it forward when it becomes live coal, others

will work thin fires right across, others a little thicker towards the bridge, and in many other ways are the fires worked; but the one considered the best is the side or alternate firing, and the gases by such a system of firing curl round to the other side of the tubes, where the incandescent or hot fire is which ignites those gases, causing complete combustion. By such a system the fires can be worked thicker, steam generated quicker, and no nuisance in the bargain.

(*d*) The drawback to light side firing is additional labour, and engine tenters and firemen say they have sufficient to do without adding to their work. This is only too true, as I find invariably black smoke is made by the men in charge of the boilers having to leave them to attend to other duties. The fires are neglected, get too low, and black smoke is the result. This can be prevented by the man being constantly in charge of his boilers, and having nothing else to do. They will then have time to fire on the suggested lines, which will be a saving to the masters and a benefit to the public at large.

The above-mentioned suggestions are all essentials for practical smoke prevention, yet there is one thing which is even more essential, and without it black smoke must be made, and that is

AIR.

We must have air to cause combustion of the gases and produce heat. This is beyond question, both in boiler and furnace. It is also admitted that it must be let into the furnaces after a fresh charge of fuel. About that, also, there is no question; but where to admit it there is much difference of opinion existing. Some say the bridge, which is beyond the fire, and others through the door into the fire. Admission of air at the bridge may assert—and experience proves it—that the disadvantages are far in excess of the advantages. Admission of air at the door is almost universal, and expert engineers contend it is absolutely essential, in order to get the best results *re* smoke and economy. The next practical point we are to consider is, shall the air admitted be hot or cold? Many arrangements have been tried, under my own personal inspection, with hot air, and I must candidly confess they have been anything but a success, both in prevention of smoke and evaporation. The fires have burned sluggish, generation of steam has been slow, and the amount of smoke the reader can easily imagine.

I have also seen the effects of cold air, which has been eminently satisfactory when introduced to the furnaces through the doors—smoke instantly cut off, fires burning briskly, and more efficiency all round. It is plain and palpable to all that our furnaces and fireplaces burn better in winter when the air is cold, than in summer when the air is hot. But there are many who stick to the old idea that cold air admitted is very injurious to the boiler. To such we would say, the injury is not real but imaginary, unless too much is admitted; but if only the necessary quantity is put into the furnace, it will improve the working of the furnace rather than injure it.

We must next consider the

QUESTION OF QUANTITY.

It is impossible to lay down a hard-and-fast rule regarding quantity, because there are many considerations—condition of working, coal, draught, and other things—to take into account. The quantity must be decided by the man in charge of the furnaces according to his firings. This is easily done by putting a given quantity of coal on each time, and allowing the number of minutes for admission of air. If that is strictly carried out (as many are doing at the present time), there will be no cause for complaint.

The next important matter is

WHO SHALL ADMIT IT,

man or machine? Either will do; it makes no matter which, because each is able to do it satisfactorily. The latter is often more reliable than the former. I do not want to say one word against the industry and the intention of the men to do all they can to solve this question. I am sure the majority of firemen are most anxious to do everything practicable, but sometimes they forget to admit the air, or they are called away to do something else; then transgression of the law takes place, and penalties follow.

In order to assist the firemen and prevent negligence, simple automatic arrangements in the shape of doors are necessary. The Court has often said (when defendants have made excuses of the kind named), "You must get a machine to assist the men and prevent negligence in the future." If an automatic door is reliable, then its advantages are many. It can be set to let in the proper amount of air, the man can leave his boilers, satisfied it will shut off the air when not necessary, and prevent a nuisance. There are doors which are automatic and otherwise on the market, and it is for steam makers and users of furnaces to select the simplest, most reliable, and best door for themselves.

It is not my intention in these articles to name any apparatus, but place the reader face to face with the facts, which will, I feel confident, enable him to decide which is the very best to meet the public requirements, those of the manufacturer, and those of his men. I have been often asked in Court and out of Court to express an opinion on the merits and demerits of various appliances, but have always resolutely refused, knowing how dangerous it would be to do so, yet at the same time I have informed inquirers what was in the market; also that they were the best judges as to what would suit their special circumstances, and by giving the results of the extensive experiments with apparatuses, such results, I trust, will lead manufacturers to select the system which will practically prevent black smoke.

Heating furnaces, or metallurgical furnaces, other than boiler furnaces.—Papers have been written, lectures given, speeches made, correspondence by the mile in the Press, and reports by Smoke Abatement Associations on smoke prevention, but all have been in reference to smoke from boiler furnaces, and not heating furnaces. They all have with one accord either unintentionally or studiously remained silent on furnaces. We might, from our own practical point of view, when thinking of reasons for such silence, say that most of the writers acted wisely in not attempting to deal with a question on which they had no practical knowledge. Not so with boilers. Though having no practical knowledge of them, they could safely say, with so many others, it has been proved black

smoke ought not to be made by boilers, and very few will contradict them when working them under ordinary conditions. But practical knowledge is absolutely necessary in order to speak with authority on boilers.

When we come to consider heating furnaces, and smoke prevention, a very intimate and extensive acquaintance with the working of them is requisite in order to decide whether any of the black smoke made in these furnaces can be practically prevented.

During the last ten years I have paid very special attention to all kinds of furnaces, and have seen them daily belching forth dense volumes of black smoke in sufficient quantity to turn daylight into darkness. I have visited the works, and by simple experiments (admitting air) the smoke has ceased, with no harm to the furnace; and my experience warrants me in saying that the greater proportion of smoke sent from furnaces can and ought to be prevented. In some cities and boroughs they are compelled to consume, as far as practicable, black smoke in all their furnaces and fireplaces, or, in default, penalties are imposed, while others (by far more numerous) are allowed to pour it out as they like, without any restriction or regulation. What is sauce for the goose ought to be sauce for the gander.

I am fully alive to the difficulties involved in practically preventing smoke from these furnaces and constantly keep in sight the various kinds of work done in them, but in spite of these much can be done. There have been attempts by various patentees to prevent it in furnaces. Some have been fairly successful, while others have been a failure. One system was so successful that, instead of preventing it, it forced it out of the furnace doors, filling the mills, and not going up the chimney; this arrangement had to be very quickly abandoned.

(*To be continued.*)

A YEAR'S PROGRESS IN SANITARY SCIENCE.*

By Joseph Priestley, B.A., M.D., D.P.H., &c.

(Continued from page 424.)

WATER FILTRATION, &c.

As to filtration, the so-called sand filtration is satisfactory, if carefully carried out; but a new method of sand filtration (the installation occupying only one-eighth of the space of an ordinary sand filter) has been brought forward during the year. It has been patented under the name of "the Fischer's System," and consists of vitrefied sand sharp sand, and finely-pulverised glass baked and hardened under very high temperatures, *e.g.*, 1000 deg. to 2000 deg. Fah.) in the form of plates, 40in. square and 8in. thick, with 2in. hollow spaces and 3in. thick walls, placed upright and arranged along the lower portion of the tank. One plate can be cleansed at a time by simply reversing the current of water, whilst the head of water necessary in using this filter is 3ft. or 4ft. Reduction in first cost and in annual working expenses, together with increased efficiency, is claimed for this method of water filtration, which has been chiefly tried on the Continent (Arad in Hungary, Worms, Vienna) Landsberg, Wusterhausen, &c.), but an installation of which can now be seen in England—at Westcott, near Dorking—an installation erected by Messrs. Hughes and Lancaster, of 47, Victoria-street, London.

Dr. Schumberg suggests the sterilisation of water by means of a solution of bromine and bromide of potassium (allowed to act for five minutes), with the addition of a solution of ammonia (9 per cent.) afterwards to remove the bromine—20 parts each of bromine and bromide of potassium in 100 of water being required.

The Pasteur filtration, as carried out on a large practical scale by the municipality of Darjeeling, is proving satisfactory, and will be of value in cases where, from any cause, the water supply of a district is suspected.

As to the metropolitan water supply, the Commission's report of 1893 practically stands good, and consequently for the next few decades London will have to depend upon the rivers Thames and Lee as sources of supply, the present sand filtration being, in the opinion of Government experts, all sufficient to warrant Londoners in resting satisfied. *Nous verrons.* Indeed, the only matter at present troubling the metropolis is as to the advisability or otherwise of its water supply being taken out of the hands of private companies and transferred to those of a trust or public board, the members of which are to be elected by the ratepayers. For the elucidating of this and other kindred matters, a Royal Commission has been allowed by the Government, appointed, and has commenced already its sittings, with instructions to consider as follows:—(1) Should the undertakings of the water companies be acquired and managed by one or more Authorities, and if so, which? or (2) should additional powers of control (and if so, what) be exercised by Local and other Authorities? or (3) whether two or more of the different systems of supply should be connected?

Similar questions are being discussed by other Sanitary Authorities outside the metropolis, and the Maidstone and other epidemics have undoubtedly been, and will be, the cause of many Authorities putting their houses in order in regard at least to water supplies.

Before leaving the subject of water supplies, it may be mentioned that during the last year the Local Government Board has at length given a decision on the subject of Sanitary Authorities engaging the services of so-called water-divining experts, and auditors are in future to be allowed to surcharge Authorities with the costs incurred therewith. The question came up in connection with Mr. Gataker (a water diviner) and the Ampthill Urban Council, and other water diviners and the Porthcawl District Council, &c.

HOUSE REFUSE, &c.

Prominence has been given to the utilisation of household dust and refuse for the generation of electricity by the installation at Shoreditch, London, of large destructor furnaces, which burn the house refuse, &c., of that particular metropolitan district, and from the heat obtained therefrom produce steam for the purposes of driving dynamos and generating electricity for lighting the public streets,

* Abstract of article contributed to the *Medical Annual*, 1898.

&c. The idea is an old one, but its practical application for the electric lighting of a metropolitan parish belongs to the past year, and the eyes of the world are watching the experiment, which, so far, is proving highly successful.

DISINFECTANTS.

Many attempts have been again made during the past year to discredit the time-immemorial method of sulphur disinfection by fumigation—the germicidal value of sulphur fumes being (it is stated) practically a minus quantity. Bacteriological evidence is brought forward to show that certain germs are not, or are at least but slightly, affected by exposure to sulphur fumes, but the practical experience of centuries is made to count for nothing, and the important fact forgotten that in all probability the value of sulphur disinfection depends upon the after-cleansing and ventilation of rooms that is so necessary owing to the tenacity of the smell of the sulphurous acid. Many practical Health Officers can prove that return cases of infection, after sulphur fumigation and due to its inefficiency, are so few, that they may be disregarded—a fact that ought to weigh well with sanitarians before condemning a well-tried friend!

"What method of aërial disinfection, other than by sulphurous acid, is to be used?" is a question that naturally suggests itself, and that has been brought prominently forward lately at congresses, societies, &c. A panacea has, in the opinion of some, been found in the so-called formalin, which, in the form of dry tablets, can be used in, *e.g.*, the Alformant lamp. By means of this lamp it is possible to regulate the precise volume of gaseous formalin required for any room capacity, and for any degree of air sterilisation or disinfection, one tablet being sufficient for the sterilisation of one thousand cubic feet of air, and ten tablets for the effectual disinfection of the same volume. Bacteriological experiments are forthcoming in quantity to show that formalin is a germicide of great value, and withal harmless to man—an important proviso that is being claimed recently for many other new disinfectants as well. This use of formalin as an aërial disinfectant has been tried before, whilst formalin as a food preservative is well known.

The Alformant lamp is the patent of Schering, brought out for the gasification of dry formalin by the Formalin Hygienic Company, Limited, of 9 and 10, St. Mary-at-Hill, London, and consists of a cylindrical mantel heated below by a spirit lamp (with suitable wick), and in the upper part of which is a vessel into which the tablets are placed. The combustion of the methylated alcohol gives off CO_2 and watery vapour, which escape through slits in the upper end of the vessel, and which in their passage take up the formalin vapours given off by the heating of the tablets.

Chemically considered, formalin is a watery solution of 40 per cent. formaldehyde gas—the gas which is given off when the solution is exposed to the air having no deleterious action on wool, silk, cotton, linen, leather, hair, &c., and little (if any) upon colours. It does not attack iron and steel. NH_3 neutralises formalin, forming the compound formamide.

The difficulties hitherto have been to find a method of practically utilising this newly-introduced gaseous disinfectant. Thus, when a commercial (watery) solution of formalin is heated, and the concentration exceeds 40 per cent., a polymerisation of the formalin occurs with a precipitation of paraformaldehyde, which burns, if the heat be continued; whilst a solution of formalin in methyl spirit (called holzin) spatters badly, and large enough quantities of formaldehyde vapour cannot be developed therefrom in a short space of time. Further, the superheating of formaldehyde solutions under pressure of three atmospheres is risky and expensive. These practical difficulties, however, appear to have been surmounted in the form in which this aërial disinfectant is now used, viz., by means of tablets of solid polymerised formalin (or paraform or tryoxymethylin, as it is also called). Each tablet is 15 grains, and may be vaporised by the so-called Alformant lamp.

The alternative method of generating the gas (Trillat's) is by no means of a calcium chloride solution of the gas in an Autoclave. The gas is dissolved in a solution of calcium chloride, and heated under pressure, with the result that practically dry formic aldehyde is evolved, and this does not polymerise. The Autoclave is a container constructed to bear a high pressure, and is provided with a pressure gauge and thermometer. When the pressure gauge shows 40 lb., the gas is evolved and escapes through a fine copper tube, which is generally thrust through the keyhole into the room to be disinfected, the Autoclave (which needs attention) being kept outside.

Whether or not formalin will supplant sulphurous acid as a gaseous disinfectant remains to be seen; and whether or not, should such supplantation take place, the results will be equally satisfactory, is for the future to decide.

As an antiseptic, its use in surgery and medicine may be mentioned—the best form for this purpose being a fine powdered formalin gelatine, known under the name of "Dr. Schleich's glutol." When placed on wounds it forms, in a short time, a firm scab, and the antiseptic is liberated whenever the glutol is acted upon and decomposed by organic and organised ferments.

The testings (bacteriological and chemical) carried out by Dr. Rideal and Mr. Sewell during 1897 go to show that "Okol" (a preparation of the Sanitas Company, *vide* "Medical Annual," 1897, page 617) has antiseptic and germicidal characters of the highest order, though it is non-poisonous to man. Okol is now shown to be an emulsion of an oil, consisting chiefly of acid hydrocarbon derivatives of the benzine series, resulting from the destructive distillation of coal and other carbonaceous matters at a high temperature.

The value of saturated steam as a disinfectant, and its superiority over superheated, was practically admitted by Mr. Washington Lyon (the patentee of the superheated machine) at the Leeds Sanitary Congress, when he stated that all were agreed as to the advantage of the now generally-preferred saturated steam. The principle involved in steam disinfection is well known and universally acknowledged, but during the year Dr. Alvah S. Doty, of New York, in connection with the port work of the city, has introduced what he states is an improved machine, in which he produces a partial vacuum prior to the admission of steam into the chamber by means of steam exhausts, producing a vacuum of 22in. in one minute, *i.e.*, a strong current of steam from the boiler (with 65 lb. to the square inch pressure) passes by the mouth of a pipe com-

municating with the interior of the chamber. There is also provided a fresh-air inlet (1½in. in diameter) connecting the interior of the chamber with the outer air, and furnished with a stop valve. The whole apparatus is enveloped in a non-conducting jacket of magnesia asbestos, which absolutely prevents heat radiation. The principle of these improvements had already been acknowledged, and similar improvements actually already adopted by the patentees and makers of the well-known machines, *e.g.*, Equifex, Washington Lyon, &c.

Current steam (with and without pressure) is preferred by some, and Drs. Délépine and Thresh have been working out machines on this principle. Where the pressure is slight, the temperature is unfortunately but little above 212 deg. Fah., but the expenses of such a machine are considerably lessened; the machine can, in fact, if required, be made in a portable form, enabling the disinfecting apparatus to be brought to the infected houses, and the necessary disinfection carried out there, but care must be taken before an authority discards the use of high-pressure steam.

In connection with disinfectants, Dr. Rideal has made during the past year a series of important experiments as to the value (if any) of the so-called medicated or disinfectant soaps. The practical outcome of the experiments is that many of the so-called antiseptic soaps belie their names—the antiseptic being destroyed or rendered inert by chemical combination with the basis of the soap used, &c. As a corollary, the fact is forced upon us that after all plain soap and water is the best disinfectant, and cleanliness the sole sanitary requirement.

Fleming's disinfectants—the so-called camphylene—are made in the solid, liquid, and powder forms, and are non-poisonous, non-corrosive, and non-staining. The active principle is evaporated continuously at ordinary temperatures when exposed to the air, and the disinfectant is therefore used as a tablet for hanging in rooms, on the person, or (in the form of moth papers) amongst clothes. The preparation that is most recommended is the camphylene cream—a fluid disinfectant of great strength, yet agreeable in odour. It possesses, of course, all the properties and advantages of camphylene as to its non-poisonous, non-corrosive, and non-staining properties, and is made sometimes mixed with ammonia.

At Barking Creek Outfall Works, says the London correspondent of an important provincial daily, there has been in progress for five years an experiment which every Town and District Councillor in the country ought to look into. It is a one-acre filter bed, devised by Mr. W. J. Dibdin, for purifying one million gallons per diem of effluent produced after precipitation of London sewage. The filtering material consists of 3ft. of coke breeze covered with 3in. of gravel. The process is to pass in first small quantities of effluent so as to gradually develope colonies of the sewage-destroying bacteria. By adopting the eight-hours a-day-system, with a complete rest on Sundays, seven million gallons a week are converted into a clean and sweet filtrate, in which fish live and swim up to the very mouth of the outlet.

SOME EXAMPLES OF SCAMPED DRAINAGE.

By Dr. W. L. Hunter, M.A., M.O.H., Pudsey.

There are yet some builders who, from ignorance, carelessness, greed, or contrariness, would, if allowed to have their own way, execute work discreditable to themselves, dangerous to the health of

Fig. 1.—Choked Drain Pipes from £25 House.

the occupants of the houses, and almost sure to be a future expense, sooner or later, to the owners. The interference of the Inspector in his efforts to secure honest work is very much resented by this

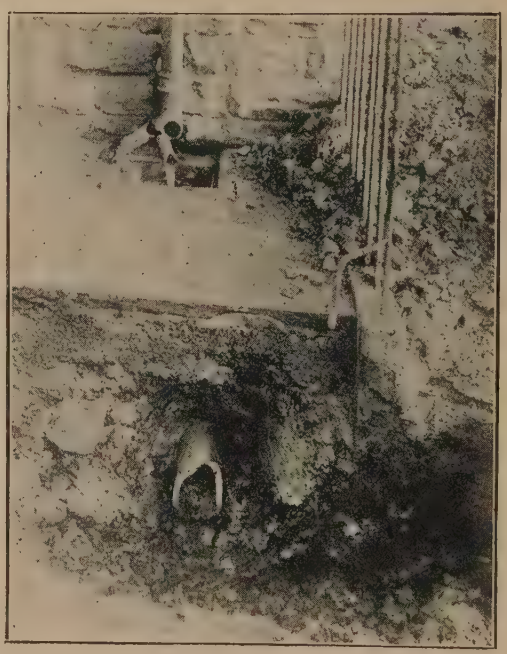


Fig. 2.—Kitchen Sink Waste-water Flowing into House Foundation.

class of builders, and they sometimes pose as martyrs suffering from the despotism of the Sanitary Authority. They, metaphorically speaking, moan, groan, and tear their hair, saying that they will be ruined, and that the progress of the district

will come to a standstill. They as much as say that it is not possible for a builder to make a living if he is not permitted to do "shoddy" or dishonest work. Incredible as it may seem, there are people —otherwise apparently level headed—who are simple enough to believe in these vapourings and

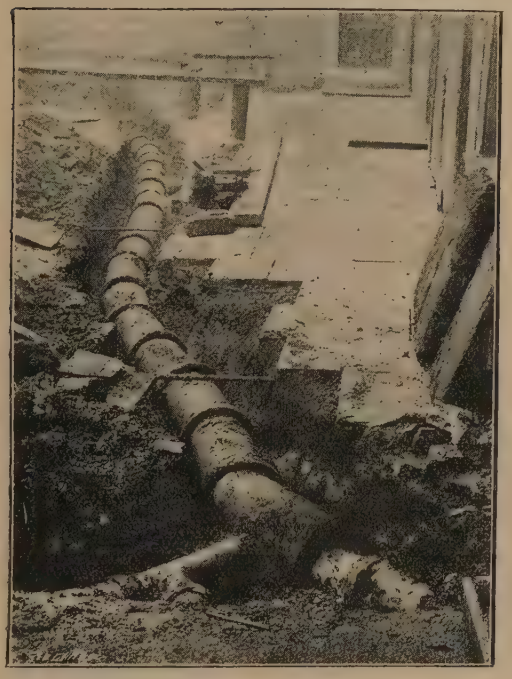


Fig. 3.—Drainage of Two £35 Houses.

who assert that it is a shame to interfere with scamped work.

There are certain well-established principles which should be insisted upon in every case; if they are departed from the result will not be satisfactory. People who are laying drains often protest that they are asked to do more than is needful, and for that reason officials have had to ask for their Council's support in order to get the work done properly. The materials of all drains should be of the best quality and pattern. Drains should be laid on straight lines and with a regular fall. There should be laid a solid foundation, and not too close to the surface. They should be properly disconnected from the sewer, and ventilated. They should be made accessible for the purposes of inspection and cleaning out. No drain that does not satisfy all these requirements should be "passed" as being satisfactory. Almost every week nuisances come to our notice that are caused by systems of drainage in which these essentials were neglected. I reproduce some recent photographs which illustrate a few of them.

Fig. 1 shows three completely choked 6in. drain pipes—the one next the gully and the two following —which took the kitchen sink waste water from a £25 house. The drainage was laid down about ten years ago. The entire drain from the house to the sewer was 30ft. long. The line of drainage was irregular; there was no provision for inspection or cleaning out. The occupier of the house did not know that the drains were choked. The drainage of the house next door was similarly choked. It is interesting to note that the gully was in a clean concreted back yard.

Fig. 2 shows the drain cut across, of a nearly new cottage house. It also shows the water which was kept running from the kitchen sink into the gully for five minutes, not a drop came through the opened drain, and therefore all the waste-water sewage must have flowed into the house foundations. There was no inspection chamber by which to discover that the drain was not acting properly.

Fig. 3 reproduces the drainage of two £35 houses showing a number of obvious defects.

In Fig. 4 we have the junction of the drain of eight back-to-back houses. (*a*) Main drain from the four houses at the back, coming under one of the front houses. (*b*) Drain from sink pipe of one of the front houses on right side. (*c*) Drain from the other front houses on right side. (*d*) Joint drain from the other two houses in front on the left side. (*e*) Main drain leading to the sewer.

The above photographs are selected from a large number which show equally glaring effects. In every case the present owner of the property had been put to considerable expense and annoyance,

Fig. 4.—Junction of the Drains of Eight Back-to-back Houses.

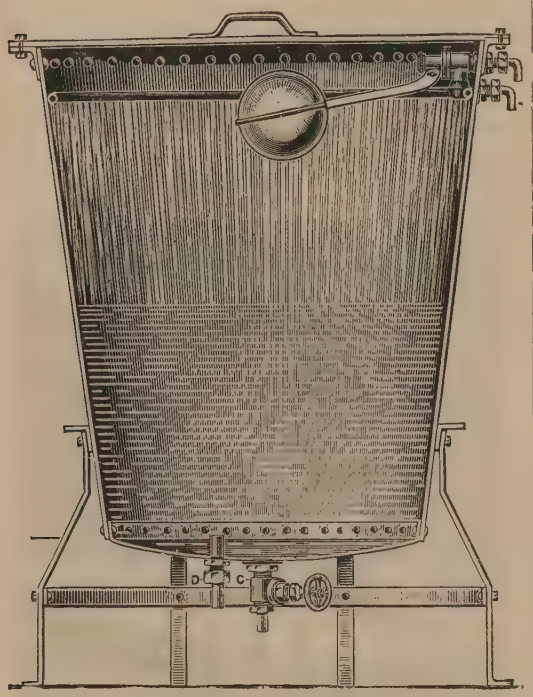
the result of former unskilful or careless work. In many cases injury to health was caused. Had the work been efficiently done at first all this would have been prevented. The moral is evident.

EAST GRINSTEAD.—A Local Government Board inquiry has been held respecting the application of the Urban Council for sanction to borrow £540 for rebuilding Hurley Bridge, widening College-lane, and the provision of public urinals in London-road and Cantelupe-road.

NEW FORM OF HOUSE CISTERN.

ANY improvements upon the existing type of house cistern are to be welcomed, more especially when they are of such a nature as to possess distinctive merits from a hygienic standpoint. Our attention has recently been directed to Durrans' "Kallio" self-cleansing galvanised iron cistern, which appears, *primâ facie*, to bear out these conditions, and concerning which, we think, a few details would be acceptable.

The question of drinking cisterns and how to ensure their cleanliness, is an ever-recurring topic with those who have the safeguarding of the public health in their hands, and the invention in question, for which we are indebted to Mr. T. Durrans,



Durrans' "Kallio" Self-cleansing Galvanised Iron Cistern.

A.R.I.B.A., architect, will, we believe, justify every consideration from those who are interested in this most important phase of sanitation.

As will be seen from the accompanying illustration, the tank is circular in shape, with conoid sides and bottom, and mounted on an iron-framed stand for easy access to a clear-way emptying valve. The ball valve has a tinned copper circular flushing pipe, so that when the valve is opened all dirt and sediment is completely washed away in a few moments. For convenience where cisterns are fixed inside roofs and in other inaccessible places, the valve (C) can be fixed anywhere with a length of pipe to discharge over a sink below, or in the bath-room; by this arrangement the valve can be turned on and off at will without the slightest trouble most effectually, and thoroughly cleansing the cistern also of sand, which is arrested from the water in settling. D is the union, with connecting piece standing up 3in. from the bottom of the cistern, for the supply of pure drinking water, and the bottom valve at the top is the union for overflow. The cistern is fitted with a galvanised iron cover, bolted down air-tight with nuts and screws to prevent any foul air contaminating the water.

Among the institutions in which the cistern is at present in use may be mentioned Sinhala restaurants, London; Maida Vale and Hall-road Buildings, Avenue Estate Buildings, Ealing; Pine-apple Nursery Estate, and Improvement Dwellings, Hall-road and Acacia-road; and we are assured that in every instance it is giving the highest possible satisfaction.

THE VENTILATION OF SEWERS.

By Dr. MEREDITH YOUNG, M.O.H., Crewe.

THERE appear to be several factors combining to produce the emission of foul gases from a sewer. In the first place, the majority of manhole covers which are supposed to act as ventilators do not act in this way at all, for the holes in them speedily become closed with dirt. In the manholes themselves there are often to be found branch drains delivering into the manhole at such a height above the invert as to cause considerable splashing and spraying of the sewage, and in consequence of this a diffusion of sewer gas. Again, in a large number of manholes heavy road detritus accumulates, and to this accumulation, unless it be swept away, organic matter clings, decomposes, and gives off offensive gases. In a flat district like this it is a matter of extreme difficulty to secure such a fall as will render the sewers self-cleansing, and this adds to the difficulty.

I am of opinion that this nuisance can only be satisfactorily dealt with by the adoption of the two following recommendations:—

First, that in streets where sewer gas makes its presence manifest, ventilating shafts should be inserted on the line of sewer as nearly as possible midway between two manholes, which manholes should not be closed up but left open. In this way the vertical shaft will act as an outlet, and the manholes as inlet ventilators. The shaft should be circular in order to lessen the loss of current by friction, and should have a sectional area of at least 28in., *i.e.*, should be a 6in. pipe. It is unnecessary to point out, of course, that the joints of such a pipe should be absolutely air-tight, and that it should discharge in a safe position away from windows and chimneys.

Second, adequate means of flushing sewers must be provided, the most convenient means, in my opinion, being underground tanks with automatic syphon flushes, or automatic flushing tippers, each of these to be of a capacity of about a hundred gallons. The experience of most engineers shows that flushing by means of flushing valves, that is by back-pounding the sewage, is not a method to be recommended. Whilst the sewage is accumulating deposit is bound to take place, and this deposit may not be altogether flushed away when the sewage is allowed to run off. The sides of the sewers are always left in a dirty condition, and the deposit on the sides may decompose and give off offensive gases into the sewer, or may dry, and any specific infective matter in the sewage is thus afforded an opportunity of getting into the sewer air, disease germs, when they exist in sewer air, most probably

originating in this way. In addition to these objections there is always danger that the pressure on the walls of the sewer or its branches, especially at joints, is likely to lead to damage to the sewer or to escape of sewage into the surrounding soil.

It must be clearly understood that the two things recommended above are recommended to be used in conjunction with each other, and not separately. It has been suggested that if householders were to flush their house drains at a certain hour on certain days in the week, and if a number of householders would co-operate in the matter, a simple and most effective means of flushing would be obtained. It is very much to be doubted whether any scheme of this kind could be made practicable. In sanitary matters the general public usually want helping, and are not eager to help themselves.

THE TREATMENT OF DAMP WALLS.

Dr. E. Vallin, of the French Academy of Medicine, recently read a very interesting and original paper on the "Presence of Saltpetre in the Walls of Inhabited Houses." This he described as a disease of the walls due to the presence of micro-organisms. As the walls could not suffer without causing serious inconvenience to the persons whom they were destined to shelter, it was the duty of sanitary reformers to seek to cure the walls and thus save the inhabitants of the houses. The disease was caused by the penetration into the body of the walls of the bacilli of nitrification, and consequently the houses became cold, damp, and unwholesome. This state was likely to occur in damp localities, and in the presence of nitrogenous organic matter. From the sanitary point of view this disease of the walls could and should be prevented or cured as we prevent or cure virulent diseases among men and animals. Consequently, Dr. Vallin proceeded to speak of the walls of a house just as if they were human beings, and went systematically through the various symptoms of their diseases. Dealing first with the prophylaxis of wall diseases, he pointed out that the primary step to be taken was to thoroughly drain the ground round the walls and isolate them from the surrounding earth, if possible by a trench and by the use of cement, asphalt, or coal tar. Thus the access of water bearing nitrifying bacteria that are aërobic would be prevented.

It was also very necessary to mix the mortar used with antiseptic solutions, such as dissolved sulphate of copper, &c. Where these precautions had not been taken and the disease had broken out, then the treatment indicated was as follows:—First, to scrape off and wash away all superficial traces of saltpetre, &c.; then the walls should be inoculated with active cultures of the anti-nitrifying baccilli which impoverish farm manure by decomposing the nitrates and by throwing off in the atmosphere a great part of the nitrogen which they contain; these walls should then be covered over with impermeable paint so as to retard the process of nitrification of the aërobic germs and, on the other hand, to stimulate the growth of the anaërobic and anti-nitrifying germs which remove the oxygen from the nitrates and from ammonia when they cannot supply themselves with oxygen from the atmosphere. This ingenious theory was highly appreciated and formed the subject of many conversations among members of the Congress. The idea of applying the principles of inoculation to the preservation of material used in building opens out a vast field of possible progress in the domains of sanitary engineering and architecture.

SANITATION AND THE FINE ARTS.

In connection with the Royal Society of British Artists, Sir Wyke Bayliss (president) gave an address in the large gallery of the Society, mainly upon the duties of the dwellers in great cities in respect to the nurture of the Fine Arts. The address was, somewhat enigmatically, entitled "Art in the House of her Friends." Having suggested, in explanation of this title, that if art had any friends anywhere, they were to be found amongst the dwellers in great cities, the president pointed to the connection between the work of the artist and the work of the sanitary engineer. What, he asked, was art but the science of beauty, and what was sanitation but the science of health? Health and beauty were almost synonyms. Where there was perfect health there was beauty, and where there was perfect beauty there was health. If

HEALTH WAS THE FOUNDATION

of the Temple of Beauty, beauty was the shrine in the Temple of Health. Unfortunately, this intimate relation between health and beauty was not popularly understood. It was not, for instance, realised that the advance of architecture was seriously hindered by the insanitary condition of our great cities. Dirt stopped the way of all the splendid developments of decoration, by virtue of which architecture took rank amongst the Fine Arts. He asked his audience to think what the *façade* of a public building might be, but for the all-pervading, ever-increasing, plague of atmospheric dirt. They need not go back in imagination to the times when their forefathers saw the splendours of Westminster Abbey, its delicate tracery, its shafts of marble, its wealth of statuary, long since lost to them in the veil of black slime that covered everything in London. Cathedrals in purer air—Lincoln, Winchester, Ely, or Salisbury—still showed what magic could be wrought by the wizards they called architects. But in London the air was thick with smoke. People passed and repassed, and knew not that the grimy objects that filled the niches of the Abbey were amongst the

LOVELIEST OF THE SCULPTURES

that the world had ever seen. This showed how much we lost of the work accomplished by the great architects of the past. But the limitation on the efforts to create new forms of beauty by the introduction of colour was also to be considered. The resources of the lapidary and of the worker in mosaic were lost to their architects because of the foulness of their atmosphere—a foulness not inherent to it, but made by the populace in the innocent process of cooking their mutton chops. He readily admitted that London must have its mutton chops, and that they must be cooked; but he submitted that they were cooked at too heavy a cost, if the cooking of them was for ever to debar architects from the use of polished marbles, mosaics, and delicate bas-reliefs. The fault was not to be charged to their climate. Milan was

amidst the plains of Lombardy ; Rome was within reach of the miasmas of the Campagna ; Genoa, Pisa, and Venice were wet with the salt mists of the sea. No, it was not the climate they in London had to fight against, but the climate plus dirt.

IT WAS THE CLIMATE

in unholy alliance with the guerilla contingents of smoke and foul gases that decimated their forces, and carried foolishness into the councils of their building committees. He asked were they ever going to clarify the air of London, and Liverpool, and Manchester, and the other dark places of the earth. If it was true of the dark places of the earth that they were full of the habitations of cruelty, it was also true that they were full of the habitations of ugliness. Were they going to give the artist that which he valued as his life—that without which life itself was of no use to him—light? If they would enable the artist to "see" their great cities, he could promise that art would make them beautiful to look upon. Passing from the subject of their enemy, the chimney, the President glanced at the importance of the gutter as an aid to the cleanliness of streets and buildings, and incidentally pointed out that the appliances necessary for the sanitation of buildings were not irreconcilable with the laws of beauty. The

AIMS OF THE SANITARY ENGINEER

fell in with the aims of the architect ; the gargoyle, primarily a gutter, was often shaped to add beauty to the fabric. The gargoyle was essentially the work of the architect, but it introduced the sculptor into the game. The reference to the sculptor brought the President to another branch of his subject. What, he asked, had become of the few works of sculpture that were supposed to adorn London? Did they not look as if they had suffered martyrdom at the hands of the gamins of the streets on the 5th of November? They were absolutely black with slime. Was that the best thing that could be done with them? If they were to be treated as guys, why should they not be made as guys? The sculptor cried for help. Who would save him and his work from destruction? The President next alluded to the effects of the "tenebrous pall" of their cities on painting. Any great scheme for the development of national and historic painting in England was hopeless so long as the present state of things continued. England had taken a high position in the history of art. There had been

TWO GREAT PERIODS OF ART,

the classic, which gave them the Parthenon, and the Gothic, which gave them Westminster Abbey. The mastery in these two schools, each perfect in itself, and neither second to the other, belonged to the people of Greece and to the people of England. The race of men who built their cathedrals were equal in artistic capacity to the race of men who built the Acropolis of Athens. They, then, as Englishmen, had a past to build upon, and ought to have a hope for the future. A pressing question, however, was, as he had shown, the establishment of right conditions. This was a question which the nation must answer through the medium of the sanitary reformer. He was confident that if this question were rightly answered, art would make the nation a rich return. After all was said and done, art was, and always must be, one of the environments of their lives, perpetually shaping them to fair or foul issues. Bad art meant much more than bad artists. It meant dreary surroundings in their dwellings, ignoble buildings in their streets, evil thoughts in their hearts. The converse of this, however, was true as regarded good art, and he earnestly appealed to his hearers to do all they could to assist in the removal of the obstacles which he had indicated as existing in the path of the artist, who should aspire to do noble and imperishable work.

THE SANITARY INSTITUTE.

LOCAL ARRANGEMENTS FOR THE BIRMINGHAM CONGRESS.

A MEETING of the Local General Committee appointed to make arrangements for the annual Congress of the Sanitary Institute to be held in Birmingham in September next was held last week. The Lord Mayor (Councillor Beale) presided, and among those present were Alderman Cook, Alderman Pollack, Councillor Lancaster, Councillor Martineau, Councillor Godlee, Lieutenant-General Phelps, Dr. A. Hill, Dr. Bostock Hill, Messrs. White Wallis, W. Bayley Marshall, J. E. Wilcox, W. Harris, A. Harris, Jordan Lloyd, D. J. Kauffmann, T. Ryland, E. Bliss, J. S. Nettlefold, G. H. Fosbroke, T. R. Bayliss, W. Henman, V. G. Milward, W. A. Hetherington, T. Price, G. C. Vaudrey, J. I. Eagres, W. F. Marston, D. Rose, W. S. Pritchett, &c.

The LORD MAYOR, in proposing the appointment of a large Executive Committee, with his lordship as chairman and Alderman Cook as vice-chairman, said that upon the sub-committees to be formed from that Executive Committee would devolve the work of making the general arrangements for the Congress, and when those arrangements were sufficiently advanced the Committee would be called together to receive the reports. In response to the appeal for funds, guarantees had been received from 230 gentlemen, but he did not think that number was very large, considering the size of the General Committee. He hoped the number would be considerably increased, so that it might only be necessary to call up a portion of the amount guaranteed. The difficulties in sanitary matters were never greater than they were at the present time, and they would probably be enlarged as the population increased. Every member of the Committee was interested in the important topics that would be discussed by the Congress, and he was convinced everyone would do his utmost to make the gathering a success.

The Executive Committee was appointed ; and the following sub-committees were also formed :—Finance (chairman, Councillor Johnstone), Reception and Hospitality (chairman, Councillor Godlee), Excursions (chairman, Councillor Lancaster), Literary and Press (chairman, Alderman Cook), Exhibition (Councillor Bisseker). The following gentlemen were appointed the local hon. secretaries of conferences and sections :—Conferences : Municipal representatives, Councillor J. H. Lloyd and Mr. E. V. Hiley ; Medical Officers of Health, Dr. Barwise and Mr. F. M. Bloomer ; Municipal and County Engineers, Mr. H. Ashton Hill and

Mr. A. D. Greatorex; Sanitary Inspectors, Mr. J. Parker and Mr. N. Deeks; Domestic Hygiene, Mrs. C. J. Bracey, Miss M. Jenkyn Brown, and Mrs. Sargant. Sections: Sanitary and Preventive Medicine, Dr. H. Manley and Dr. T. S. Short; Engineering and Architecture, Mr. H. T. Buckland and Mr. S. R. Lowcock; Chemistry, Meteorology, and Geology, Professor Frankland and Professor Kauffmann. Mr. W. S. Pritchett was appointed the local secretary.

Alderman COOK, in proposing a vote of thanks to the Lord Mayor for presiding, expressed the pleasure everyone felt at the personal interest taken in the Congress by the Lady Mayoress, who would be the president of the conference on domestic hygiene. While the Health Committee were fully occupied with general questions on sanitation, their attention had of late been particularly directed to the cleansing of the courts, but they felt that that alone was insufficient, and desired, if possible, to carry the reforming influence inside the houses. He thought that result would probably be best achieved with the assistance of the ladies, and the conference over which the Lady Mayoress would preside would direct special attention to that subject. The resolution was adopted, and the meeting closed.

A meeting of the Executive Committee was subsequently held under the presidency of the Lord Mayor, who reported that Sir Joseph Fayrer, Bart., K.C.S.I., M.D., LL.D., F.R.S., had accepted the office of president of the Congress. The officers were requested to nominate a list of vice-presidents, and the sub-committees, in conference with the officers, were authorised to make the preliminary arrangements for the Congress and report to the Committee.

THE NATIONAL REGISTRATION OF PLUMBERS.

MEETING AT ABERDEEN.

DR. MATTHEW HAY, Medical Officer of Health for Aberdeen, presided at the annual meeting of the District Council for the counties of Aberdeen, Kincardine, and Banff, which was recently held at the Gordons College, Aberdeen. The chairman, in moving the adoption of the report, said that last year had been characterised by as much vigour in the movement as any previous year, if they had regard to what had gone on all round the country. The two most notable events of the year no doubt were the submission of the Plumbers' Registration Bill in Parliament, and the preparation of the model regulations and bye-laws for the drainage and plumbing work of buildings. The Bill more nearly reached the point of passing than ever it did before, coming to the third reading, when it was "talked out" on account of some slightly factious opposition. That gave them, however, great reason to believe that the Bill that had been introduced this session—a new measure with many fresh features—was one likely to commend general support and become law, unless the pressure of foreign affairs prevented home business being attended to in a satisfactory way. A careful perusal of the Bill led him to think it was likely to conciliate previous opponents, and if it did pass, the registration movement would be put upon an entirely different and a very much better footing. He then pointed to the advantages to be derived by journeymen becoming registered before the Bill passed, and mentioned that at present they had several young men applying to be examined. It was gratifying to know that the class for instruction in plumbers' work still continued to be largely attended. It was almost unprecedented that there should be so many as forty-one young plumbers in attendance. When one considered that year after year for the last ten years there had been almost equally large numbers in attendance, it showed that a large amount of interest was being taken in the classes. The next Congress would be held in Glasgow in August, and as the people there had all along taken a very enthusiastic interest in the registration movement, the gathering was likely to prove very successful.

Mr. A. B. ROBERTSON seconded the adoption of the report, which was agreed to.

Mr. KENNETH CAMERON, Sanitary Inspector of Aberdeen, moved:—"That this meeting, believing that the registration of plumbers under parliamentary sanction would greatly promote the public health by helping to ensure sound plumbing and drainage, and that the voluntary system at present in force, although accomplishing much good, does not adequately meet the purpose in view, resolves to cordially support the Plumbers' Registration Bill at present before Parliament, subject to such suggestions, if any, for its improvement which the District Council may make, and instructs the Council to use its utmost endeavours to aid the passage of the Bill through Parliament." Mr. Cameron mentioned one or two of the provisions of the Bill, and urged all men not at present registered to join before the Bill becomes law.

Mr. J. F. ANDERSON seconded, saying that not only would the whole trade be in a much better position if the Bill passed, but the public even more so.

Mr. R. G. WILSON, architect, proposed:—"That this meeting being of opinion that the model regulations and bye-laws for the drainage and plumbing work of buildings prepared by a Committee of the six District Councils of the National Registration of Plumbers in Scotland, and recently published by authority of the Councils in congress, provide a reliable and well-considered code of regulations for such work, resolves that it is desirable in the interests of the public health that such regulations should be adopted and put into operation by all Municipal and Rural Authorities within this district as soon as may be practicable." They had bye-laws of their own, he said, for some time in Aberdeen, and were working smoothly under them; but it was different when they went outside the city. They had nothing there to guide them, and he hoped some uniform system such as this would be adopted throughout Scotland. It represented the wisdom of the District Councils composed of men well qualified to draw up such regulations.

Mr. W. GARDEN seconded.

The PRESIDENT emphasised the absolute impartiality with which the bye-laws had been drawn up by those engaged in sanitary work in the interests solely of public health. He knew of no better code; and he was aware that the Local Government Board was carefully considering the question of such bye-laws with the view of helping Rural Authorities in adopting a code. He hoped that although Aberdeen

was one of the four cities exempted from the operation of the Burgh Police Act, it might in some future local Act obtain power to make such bye-laws and enforce them directly, for though a similar code was in operation at present, it could not be enforced directly by the Dean of Guilds Committee.

The motion was agreed to, and the proceedings terminated.

Annotations from Annual Reports.

Soil Temperature as a Factor in Diarrhœa Outbreaks.—Dr. T. Ridley Bailey, M.D., M.O.H., Bilston, points out how it is that a certain soil temperature has an important bearing on this disease. The temperature of the atmosphere itself plays no part in the causation of an epidemic of diarrhœa except its slight influence on the range of the subsoil temperature. Thus Baldwin Latham has shown that at Croydon the average temperature of the air in the summer months of one year was 59·4, and for the same months of the succeeding year 61·1, yet the deaths in the former year from diarrhœa were more than five times as many as in the latter. The reason, apparently, is due to the differences in the level of the subsoil water. The moist soil will not heat as quickly as if it were comparatively dry, and therefore in a dry season a less atmospheric temperature is sufficient to bring the soil temperature to that point which is necessary for the development of the germ of the disease. Therefore, the observation that diarrhœa is more likely to be prevalent when the subsoil water is low is probably correct, and is in harmony with the view that "whatever the air temperature may be, diarrhœa does not appear in epidemic form until a definite temperature is reached at a given depth below the surface of the soil." It will be obvious how essential it is that saturation of the ground, particularly near to human dwellings, from deficient or absent spouting, surface water, by leakages from ashpits, cesspools, &c., should be avoided.

Typhoid on Farms.—Dr. R. W. D. Macmartin Cameron, Medical Officer of Health for the counties of Kirkcudbright and Wigtown, in his annual report, gives an interesting example of how typhoid may be generated on farms. "A farm, say, is supplied from a spring of excellent water situated in a field under permanent pasture, and the water is led through the land in ordinary field tiles. So far so good. But some fine day Agricola conceives the idea of ploughing the field (perhaps he is a new tenant and doesn't know better), and plough it he does up to the very edge of the spring, and manures it plentifully. The oats are sprouting nicely, or in the following year more probably the potatoes have just begun to show their pretty blossoms, pink and white, when the cotman is seized with typhoid fever, and the master grumbles at being deprived of a milker in the person of the sick man's wife. Next, perhaps a servant girl in the farm house is 'took bad,' and the farmer, quick to perceive the advantages of hospital isolation where a servant is concerned, makes prompt demand for her removal. The water meantime has been analysed and condemned, and a 'notice' duly served upon the landlord. But not until the farmer's own children fall ill, or he begins *in propriâ personâ* to feel that somehow his 'Bladenoch' or 'Long John' has ceased to do him quite the same amount of good as formerly, is he thoroughly aroused to the danger of the situation. Mighty then his wrath, and boundless his indignation at any delay in providing him with a new water supply in lieu of that he has himself ruined with his midden and his plough. This form of water pollution, I am satisfied, is one of the commonest causes of typhoid fever in agricultural districts. Excuse for it there is none."

Advantages of Public Abattoirs.—Dr. J. H. Barrett, M.O.H., Cheltenham, is a strong advocate of public abattoirs, concerning which he writes as follows in his annual report for 1897:—"The great advantage to the public of having all animals intended for human food killed at a public abattoir must be apparent to everyone who troubles himself to think upon the subject. Not only would it lead to the abolition of the numerous private places used for the purpose, and so improve the conditions of the localities where they are situated, from the point of view of general sanitation, but what is quite as important, if not more so, the centralisation of this business would allow of the ready inspection of all animals intended to be slaughtered, as well as of the meat as prepared for sale, and the foisting upon the public of the flesh of diseased animals at the usual price of sound meat would be prevented. Our own public abattoir has proved an undoubted advantage in these respects, and it is a matter of regret that its use should be limited to a portion only of the butchers of the town. The butchers consider their own immediate interests before all else, and do the best they can to guard them. In this they do not differ from other sections of humanity. Thus they are unwilling to forego the little conveniences attaching to slaughter-houses in proximity to their shops, which they can use at any time of day or night, and go instead to a public abattoir situated half a mile away, where all they do will be under surveillance and criticism. It is futile to expect them to do this of their own free will, and the process of compulsion under such legal powers as have ever yet been obtained is a difficult and costly one. Right, as established by usage in regard to the use of private registered slaughter-houses, is recognised by the law, and has to be bought out, a matter which would appear to result in interminable negotiations, and which cannot always be carried to a successful issue without awakening animosity in the minds of interested parties. The general law upon the subject is weak and unsatisfactory alike for both the governing Corporation and the butchers, and the whole question of slaughter-houses and meat inspection will not be satisfactorily settled without some amendment of the general law."

Water Supplies to Vessels.—The provision of a pure water supply on board ship is a matter of such paramount importance, writes Dr. J. E. O'Connor, M.O.H., Lowestoft, as to demand the most serious consideration by all Port Sanitary Authorities. The disastrous results of a specifically polluted public water supply have been tragically illustrated in this

country during the past year, but nothing can be more terrible than the outbreak of an infectious disease on board a ship, whose crew is compelled to drink a water containing the *materies morbi* itself. Every available precaution ought therefore to be seized upon with avidity, in order to prevent the possibility of such a calamity. Our present system of watering ships from large storage tanks I must unhesitatingly condemn. These tanks are cleaned at irregular and infrequent intervals, and must of necessity contain a large amount of sediment. I advise that their use be discontinued, and that ships should receive their water directly from the mains. A matter of equal or greater importance is, however, the provision for water storage on board ship, and I feel it my duty to report that the wooden casks which are used for this purpose on many Lowestoft fishing boats should be abolished. The alternate wetting and drying of the inner surface of these casks induces decomposition, and this is favoured by want of light and ventilation. Further, any organic sediment that the water may contain is deposited and becomes intimately incorporated with the inner surface of the wood. Water tanks on board ships should be constructed of iron, coated inside with cement-wash. There should further be provision for cleansing purposes, and the cleansing should receive more careful attention than is at present the case with the majority of these tanks. With regard to larger vessels I would urge that shipowners should take the advice of Dr. Collingridge, the Medical Officer to the Port of London, and encourage the perfecting of "distilling apparatus, rather than appliances for storage and filtration."

Antitoxine Treatment of Diphtheria.—In the report of Dr. Henry Kenwood, Medical Officer of Health, St. Mary, Stoke Newington, the following observations occur:—"Ample time has now been afforded for testing the efficacy of 'antitoxine' in the treatment of diphtheria, and the opportunities have been all too frequent during the past six or seven years. Good reports upon its employment come from all quarters of the globe, and the very few contrary statements which have come to hand have either been based upon inadequate trial or improper employment of the serum. The remedy is too generally used as a *dernier ressort* after the patient is moribund or requires tracheotomy, and even then it is notorious how rapidly the distressing symptoms, as a rule melt away. It is thought by some that although it does such a great deal of good during the acute attack, it does not diminish, even if it does not increase, the subsequent tendency to fatal heart failure. I know of no convincing statistics in support of this point, but it is conceivable that if antitoxine is the means of bringing a patient over the acute attack, it may appear to increase the number of deaths from subsequent heart failure from the circumstance that it enables many to reach the dangerous period following the acute attack, who otherwise would have died beforehand."

HASTINGS.—The Local Government Board has sanctioned the borrowing of the following sums, viz.: £744 for extending water mains; £7658, £3094, £1761, and £2803 for new water mains.

General News.

MERIDEN.—The Rural District Council has decided to purchase a steam-roller.

ST. DOGMELLS.—The Rural District Council is about to appoint a surveyor at a salary of £100.

ITCHEN.—A surveyor and sanitary officer is to be appointed for this new urban district, at a salary of £125.

REDRUTH.—The Urban District Council has obtained sanction for the balance of £460 of its water loan.

LLANGOLLEN.—The Urban District Council is reopening negotiations with the Vivod trustees with regard to the proposed water supply.

TAUNTON.—A Local Government Board inquiry has been held into the application of the Town Council to borrow £31,500 for waterworks purposes.

CREETING ST. PETER.—The East Stow Rural District Council has decided to apply to the Local Government Board for £350 for the erection of tanks, &c.

BERWICK.—The Town Council has decided to charge by meter for water used for trade purposes, and a committee has been instructed to prepare a scheme.

CLECKHEATON.—A Local Government Board inquiry has been held into the application of the North Bierley Joint Hospital Board to borrow £2300 for hospital extensions.

CORPACH.—Operations in connection with the introduction of a new water supply for Corpach have been commenced. The contractor is Mr. Robert Harper, of Fort William.

NEWPORT.—The Corporation is asking for the sanction of the Local Government Board to the borrowing of the £7500 for extensions to the Alteryn infectious diseases hospital.

CLONTARF.—A Local Government Board inquiry has been held into the application of the Commissioners for loans of £1000 for street widening and of £550 for laying water supply extensions.

DUNSTABLE.—In consequence of opposition to the proposed site for the new slaughter-house, a special meeting of the Town Council has decided to visit the spot before coming to any definite decision.

ANNAN.—The report and plans for a public slaughter-house prepared by the Surveyor have been agreed to by the Town Council. The cost is not to exceed £1000, and the site will be on the Burgh Merse.

PLYMOUTH.—As alterations to the city water scheme suggested by the Admiralty would involve an expenditure of an additional £200,000, and also in consequence of strategical reasons, it appears that the scheme is again doomed.

WISHAW.—At Westminster, on the 21st inst., a Select Committee of the House of Commons proceeded with the consideration of a Bill for the purpose of obtaining an additional supply of water for domestic and manufacturing purposes in Wishaw The Bill was opposed by the Middle Ward District Committee, the County Council of Lanark, and the Earl of Home.

LONDON, E.—The Vestry of St. George's East has decided to provide an underground public convenience for men in Cable-street, 20ft. west of Cannon-street-road, at an estimated cost of £550.

WOLVERHAMPTON.—The Town Council has accepted the tender of Messrs. Henry Willcock and Co., amounting to £3374 15s., for the erection of a first-class swimming bath and its appurtenances, on the north side of the existing bath buildings.

SWANSEA.—At a recent meeting of the Town Council it was decided to accept the tender of Messrs. Patterson and Son, Glasgow, at £255,747 16s. 6d. for the construction of the Cray Waterworks and tunnel, and to apply for a further loan of £100,000 towards the work.

CHELSEA.—The quarterly report of Dr. Louis C. Parkes, Public Analyst for Chelsea, was recently submitted to the Vestry. It was as follows:—"Twenty-four samples of milk were submitted to analysis during the quarter, twenty-two being genuine, one of inferior quality, and one adulterated with 10 per cent. of added water. Twelve samples of drugs and medical prescriptions were submitted to analysis. Seven of these were genuine samples, and five were deficient in strength below the standard prescribed by the British Pharmacopœia. Two samples of mustard, two of arrowroot, and two of cornflour were examined, all being genuine."

LIVERPOOL.—A Local Government Board inquiry has been held to inquire into the circumstances attendant upon the application of the City Council for sanction to borrow £38,000 for the purchase of a site at Fazakerley for an infectious diseases hospital. The Town Clerk explained that the land consisted of 113 acres, and the price the Corporation had agreed to pay for it, subject to the sanction of the Board, was £37,150, which roughly worked out at about £330 an acre. The Corporation did not propose at the present time to submit any plan to the Board showing how the site was going to be utilised, but merely to prove that it was desirable to acquire it for the purposes of future hospital development. The property was situated in Fazakerley, and stood at an elevation of 69ft. above Ordnance data.

Personal.

MR. W. C. WILLIAMS has been appointed Analyst for the County Borough of Bootle.

MR. HUGH JONES has been appointed Medical Officer of Health for the rural district of Dolgelly.

MR. J. H. HOLDING has been appointed Medical Officer of Health for the rural district of Bideford.

MR. H. M. APPS has been appointed Inspector of Nuisances for the rural district of Hollingbourn.

MR. COSMO GRANT has been appointed Medical Officer for the Hadleigh district of Rochford Union.

MR. R. H. ASTON has been appointed Medical Officer for the twelfth district of North Brierley Union.

MR. T. OLVER has been appointed Medical Officer for the third district of Plympton St. Mary Union.

MR. W. R. MCLEOD has been appointed Vaccination Officer for the Mitcham District of Croydon Union.

MR. E. V. PERRY has been appointed Medical Officer for the Great Witchingham district of St. Faith's Union.

DR. W. GROOM has been appointed Medical Officer for the first, second A, and eighth districts of Wisbech Union.

THE Council of the Sanitary Institute has transferred to the class of Fellows Mr. Wm. Spinks, A.M.I.C.E., of Leeds, and Lecturer on Sanitary Engineering at the Yorkshire College.

MR. J. E. ST. G. JOHNSTONE has been appointed Medical Officer for the Triley district of Tewkesbury Union; Mr. W. C. Devereux Medical Officer for the Tewkesbury district; and Mr. A. F. Turner Medical Officer of the workhouse.

Sewerage Schemes.

[TO MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

MR. C. JONES has been retained to prepare drainage scheme for Billericay.

AT a recent meeting of the Roundway Parish Council an informal discussion took place upon the Breachfield sewerage scheme, which is likely to be an expensive matter to the parish.

TAUNTON Town Council has decided to apply to the Local Government Board for sanction to borrow £18,250 for adapting the present Taunton sewage works to the septic tank system, and completing the purchase of Lambrook Farm in connection therewith.

AT the last monthly meeting of the Bradford-on-Avon Urban Council Lord Edmond Fitzmaurice was asked to wait on the Local Government Board in London in order to secure replies to certain questions which have been asked in relation to the proposed scheme of sewage disposal.

A DEPUTATION of Acton Ward ratepayers recently visited the Shoreditch Vestry, calling attention to the inconvenience and ill-health they had suffered from the defective sewerage in Shrubland-road. In obedience to the commands of the Vestry many residents had had their drains re-laid, but all to no effect, for the builder informed them that there was not sufficient fall into the main sewer. In the summer it was a common practice to cover the ventilator in the road with a sack to keep back the noxious smell, and the residents were greatly disappointed that the road was not included in the scheme for dealing with the Haggerston sewerage. It was urged that the wishes of the deputation should be immediately carried out, but it was resolved to refer the matter to the Works Committee.

A Local Government Board inquiry has been held at Hornsey into the application of the District Council to borrow £3100, including £600 for surface drainage at Fortis-green.

The Tong District Council having made overtures regarding the sewage disposal of Tong village, the Drighlington District Council has decided to invite a deputation from the Tong Council to attend the next meeting regarding the question.

The Midhurst District Council has decided, in view of the fact that a Royal Commission has been appointed to consider the question of the drainage of small towns, to present a humble petition to the Local Government Board asking it to allow the Council to postpone the drainage scheme pending the report of the Royal Commission.

A Local Government Board inquiry has been held at Tavistock respecting an application for permission to borrow £300 for sewerage purposes in Tavistock Urban District. The Inspector thought the Local Government Board would not be likely to sanction £300 more being spent unless security were given that there would be an outfall.

The London County Council (Acton Sewage) Bill came on Thursday, the 21st inst., before the Select Committee of the House of Commons. It appeared from the opening statement of Mr. Pope, Q.C., that the object of the Bill was to require the Acton Local Board, whose sewage passes through the metropolitan main drainage system, to bear their share of the cost of the original construction of that system and its maintenance, the capital outlay having been some seven millions and the annual cost of maintenance about a quarter of a million. The Bill was again before the Committee on Friday, the 22nd inst., when further consideration was adjourned until Thursday, the 28th inst.

At a recent meeting of the Sanitary Committee of Pembroke Dock, the report of Mr. Beesley, C.E., on the amended scheme for sewering the town, was read. It will be remembered that the Local Government Board would not sanction any scheme which had an outlet higher up than the Carr Spit, and the engineer had to alter and amend his plans accordingly. The scheme as now propounded will entail expenditure of no less than £27,000—about £10,000 more than the original, and great indignation was expressed by the members on account of the opposition of the Local Government Board. This opposition is based on the assumption of injury to the "oyster beds" in the haven, whereas the "oyster beds" have no existence, only a few of the bivalves having survived the energetic operations of that little colony of fishermen and fisherwomen, the Langwms. The Committee passed a resolution condemning the amended scheme, because an outlet could be more easily found. It was agreed to point out to the Local Government Board the financial position of the borough, and also the fact that the Inspector reported favourably on the other scheme, and that the County Council had also reported favourably thereon.

A considerable area in the neighbourhood of the Borough, Southwark, is to be re-sewered. The estimated cost is £4222 12s. 7d., and the work will be carried out by the St. George's Vestry workmen. A loan of £4250 is being asked for from the County Council to defray the cost.

The method of utilising the town sewage which has been in vogue for some years at Congleton appears to be answering satisfactorily from the agricultural point of view. Mr. Brown, of Smithy Farm, Congleton, has been comparing the results produced by this and the ordinary commercial manures, and the outcome is greatly in favour of the sewage.

The recent opening of the Mangotsfield Sewage Works attracted a large number of visitors, who expressed much satisfaction with the scheme, and the excellent effluent resulting from the rapid purification process. A noteworthy feature is the method of construction, whereby complete purification works are erected upon a limited area of ground that formerly would have been considered impossible for the purpose. After passing the detritus and screening chambers, the sewage, of a strong domestic character, with some manufacturers' and slaughter-house refuse, is treated with ferozone, from 2 to 3 grains per gallon being found sufficient, it then flows through horizontal inlet pipes to 15in. vertical tubes in the centre of the Candy circular upward flow precipitation tanks, and falls, within 2ft. of the bottom, on to spreading plates. There is an outer cylinder 5ft. in diameter, reaching from about 6in. above water level to 6in. below the spreading plates; by this means further contact with the ferozone is given, and at the same time the precipitated solids overlying the bottom of the tank are not disturbed by the incoming sewage; a large volume is thus enabled to be rapidly dealt with, a continuous flow is maintained, and the effluent delivered without loss of level, a matter of great importance where the fall is limited. The tanks, two in number, are capable of dealing with a flow of one million gallons daily, and are fitted with Candy's patent automatic sludge removal apparatus; each tank is 24ft. in diameter, with 15ft. 6in. depth of sewage, the total area occupied by them being about 64 square yards. After leaving the tanks the effluent passes through clarifiers, of which there are five, each 7ft. in diameter by 8ft. high. The space occupied by these clarifiers (which are capable of dealing with a similar volume of sewage as the tanks) is about 63 square yards. The effluent from the clarifiers runs on to concentrated polarite filters, which can deal with 1500 to 2000 gallons per square yard per twenty-four hours. The superficial area of the polarite filters is about 480 square yards, so that the modern and successful purification installation for purifying one million gallons per day is contained within a total area of about one-sixth of an acre. A remarkably pure effluent is obtained, far above the ideal standard recommended by Sir Edward Frankland, of the late Royal Commission. Much satisfaction is felt because the sewerage and sewage disposal scheme, which includes eighteen miles of sewers, has been ably carried out under Mr. Le Maitre, C.E., of Staple Hill, Bristol.

Lighting.

THE London County Council has written the Islington Vestry agreeing to grant a loan of £13,662 for electric lighting works.

THE Corporation of Swansea has decided to borrow £60,000 for the electric lighting scheme, and to proceed with the work as soon as possible.

THE Great Marlow Gas Company has decided to extend the mains of the company to Bourne End and Wooburn at an outlay of between £4000 and £5000.

THE Town Council of Taunton has decided to apply to the Local Government Board for sanction to borrow £11,500 for the renewal of the electric lighting plant.

IT is intended to borrow £12,000 to defray the cost of a new retort-house and additional outlay on mains and meters for the Smethwick District Council's gasworks.

THE City Council of Manchester has decided to apply to the Local Government Board for sanction to borrow a further sum of £200,000 for various works of extension in the electric lighting department of the Corporation.

THE Metropolitan Radical Federation has passed resolutions protesting against the increase in the price of gas by the Gas Light and Coke Company, and expressing its opinion that the gas supply of London should be in the hands of the London County Council.

THE Aberystwith Gas Bill, which confers further powers on the gas company, recently came before the Chairman of Ways and Means as an unopposed measure. The Bill passed the Committee, and was sent for third reading in the Commons. It has passed the Lords.

THE Gas and Electricity Sub-committee of the Bradford Corporation has decided to light the two new tram routes to Great Horton and Bolton respectively by electricity. The lamps are to be placed upon the alternate poles carrying the wire to supply the motive power.

A LOCAL Government Board Inquiry has been held at Barking into the Urban Council's application for sanction to borrow £15,000 for the purposes of electric lighting. The application was opposed by the Gas Light and Coke Company, who are the largest ratepayers in Barking, and also by a number of smaller ratepayers.

THE Whitwick and Coalville Gas Bill, which has already passed through the House of Commons, came before the examiners of the House of Lords on the 21st inst. for proof of compliance with the further standing orders. There was no opposition at this stage, and the necessary formal proofs having been given the Bill was ordered to be reported for second reading.

AT a recent meeting of Edinburgh Town Council it was agreed to raise the salary of the resident Electrical Engineer from £500 to £600 per annum. Considerable discussion took place upon an amended proposal to erect fifty-seven electric arc lamps and three gas lamps in Grange-road, Inverleith-row, London-road, and Calton-road. A motion to disapprove of the recommendation was defeated, and it was thereupon resolved to add thirteen electric arc lamps between Donaldson's Hospital and Coltbridge.

AT a special meeting of the Oldbury Urban District Council held recently, the Clerk explained that at the last meeting of the Council he was instructed to try and arrange terms with the Midland Corporation for supplying Oldbury with electricity. The terms were that the District Council should obtain an order from the Board of Trade for supplying electric light for all public and private purposes, and that the Midland Corporation should also obtain an order to supply the manufacturers. The Midland Corporation had agreed to drop its application for an order altogether, leaving the District Council free to obtain its order for all purposes, and an agreement would be entered into for the Council to get the electricity in bulk from the company. It was agreed to accept these terms.

Law Cases.

BLACK SMOKE NUISANCE AT MANCHESTER.

CORPORATION FINED.

AT the City Police-court, before Mr. Headlam, a summons against the Corporation for disobeying an order made in January last to abate a nuisance arising from the emission of black smoke from one of the retort-houses at the Bradford-road Gasworks came on for hearing.

Mr. A. T. ROOKE, Superintendent of the Sanitary Department, appeared in support of the prosecution, which was instituted by Inspector Rowe as an inhabitant of the city, under the 105th Section of the Public Health Act. On the 14th March the Inspector took observations in the neighbourhood, and recorded four minutes' emission of black smoke in a period of thirty minutes.

Mr. T. MILLER, assistant solicitor to the Corporation, appeared for the defence, and read the following letter, which had been received from the Lord Mayor, with respect to the case:—"I am obliged to you for reminding me (as chairman of the Gas Committee) that the summons respecting smoke at Bradford-road Gasworks is to be heard at Court to-morrow. As you know, it is the meeting of the Council to-morrow, and so I cannot attend Court or should certainly do so. I should like personally to explain to the magistrates the extreme difficulty of our position, and how a gasworks of such dimensions cannot at all fairly be treated as an ordinary works or factory. Here we carbonise 150,000 tons of coal a year—a plant equal to making eight million cubic feet of gas per day, and there must be some smoke with all this work going on. The fact is, it would be just as sensible to require a miller not to make any dust. As a matter of fact,

we have the best smoke-prevention appliances; we burn nothing in our fires except coke, not an ounce of coal. I have now, or rather a few days ago, given special instructions to our new deputy manager to do all he can to have as little smoke as possible pass, and we cannot do more. Indeed, as we do not burn coal in any of our furnaces, I utterly fail to see how black smoke can be emitted, except in the ordinary process of carbonising."

MR. HEADLAM intimated that the Court could hardly accept such a defence, and imposed a penalty of 20s. and costs.

Correspondence.

We do not in any way hold ourselves responsible for opinions expressed by our correspondents.

BOVINE TUBERCULOSIS.

(*To the Editor of* THE SANITARY RECORD.)

SIR,—Would you permit me to draw your attention to the two following statements appearing in your Supplement on page 27 :—

"The fattening of cows in a moderate state of tuberculosis for slaughter." (Professor Delépine, of Owens College.)

"The condition of the carcase was fairly good, but on examination of the lungs I found evidence of tuberculosis." (S. Edmonson, Sanitary Inspector, Burnley.)

And the tuberculosed carcase was condemned.

Now, Sir, the question to be solved in this case is the following one. Assuming for a moment, and on the authority of Professor Delépine, that "a moderately tuberculosed beast is slaughtered" for food, how far may the disease penetrate into the system before it is unfit for human food? In the Burnley beast, the lungs were affected. Some practical butchers very strongly assert that until the kidneys are diseased, there is no danger in eating the flesh of such a beast after it has been properly dressed by a skilful butcher. The statement of the Professor seems to give strength to the statement of the butcher, and should I be correct in my surmise, a wrong has been done in the Burnley and kindred cases. But should those who contend for the destruction of all tuberculosed meat be right, I hope they will prove their case in the most satisfactory way possible.

The two statements that I have drawn your attention to cannot be allowed to pass muster in the name of sanitary science.—Yours faithfully,

SANITARIAN.

PUBLICATIONS RECEIVED.

Journal of the Sanitary Institute. Vol. XIX. Part 1. 2s. 6d.

Sanitary Engineering. By W. Paul Gerhard. New York. No price stated.

Public Works in Lancashire for the Relief of Distress, with Appendix on the Sewering of Towns and Draining of Houses. By Robert Rawlinson, C.E. 1s. P. S. King and Son.

Notes and Queries.

Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C 1

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

1050.—SEWER AIR AND DISEASE: RELATIONSHIP.—"Surveyor" writes:—"Can you or any of the medical readers of the journal tell me if there is any relationship between abscesses, carbuncles, and sewage emanations? Some time ago I commenced taking gaugings of a sewer in a very awkward place, where for a short time I had to hang my head over a very offensive point in the sewer. Not long afterwards I had to undergo an operation for the removal of an internal abscess. On recovering from this, further abscesses have begun to appear. Is it possible there is some connection between my troubles and the sewage emanations?"

Answer.—It is well known that abscesses may be developed by inoculation of specific micrococci or microbes; and Klein states that he has come across the species *staphylococcus aureus*, closely similar to the species which is most common in acute purulent inflammation and in sores following the discharge of abscess, in blood, in air, and in dust. The inhalation of sewer air by those who, unlike sewermen, have not been acclimatised to it, is frequently productive of a well-recognised form of malaise, and in some cases of particular forms of disease. One or more of the symptoms predominate over the rest, according to the idiosyncrasies of the individual. While we are not aware that acute phlegmosis or abscesses have been noticeable in persons who have been exposed to the poison of highly offensive sewer air, we think, however, it is very possible that a relationship may exist between them; and we consider it a matter for investigation on the part of Medical Officers. We shall also be pleased to hear whether illness similar to that mentioned by our correspondent has been observable in the experience of Medical Officers, and also of Surveyors and Inspectors who have the superintendence of workmen employed in sewers.

1051.—PUBLIC HEALTH (SCOTLAND) ACTS: PRIVY ACCOMMODATION NOT ENFORCEABLE UNDER.—"R. B. M." writes:—"In what Act (Scotland) do you find a provision to compel the owner of every inhabited property to provide ashpit and privy accommodation for such property? State briefly the provision. I may point out that this question was set at a recent examination of the Sanitary Association held in Glasgow."

Answer.—We have gone carefully through the Burgh Police (Scotland) Act, 1862, and the Public Health (Scotland) Act, 1897, and are surprised to find that while in those towns only where the earlier Act applies the Local Authority may enforce the provision of water-closets to dwelling-houses, the Act of 1897 is silent as to provisions for enforcing privy or water-closet and ashpit accommodation for dwelling-houses. The omission is one which appears to us to be a singularly inept one. Sec. 16 (Sub-sec. 2) of this Act defines that a privy or ashpit, so foul or in such a state as to be a nuisance, constitutes a nuisance, and Secs. 29, 72, and 94 enable a Local Authority to enforce privy accommodation for schools, houses, factories, and lodging-houses, and Sec. 181 provides for the making of bye-laws for regulating the construction and arrangement of water-closets, earth-closets, and privies and ashpits, but none of them enable a Local Authority to enforce the provision of water-closet, privy, or ashpit accommodation to dwelling-houses, where no such accommodation at present exists. In other words,

there are no provisions in the Public Health (Scotland) Act, 1897, corresponding to Secs. 35 and 36 of the English Public Health Act, 1875, and as the law at present stands it appears to us a Local Authority have no power to enforce the provisions of water-closet, privy, or ashpit accommodation to either old or new dwelling-houses in districts other than those under the Burgh Police (Scotland) Act, 1862.

1052.—Scavenging Districts: Sanitary Conveniences in: Public Health (Scotland) Act, 1897.—"R. B. M." writes:—"What kind of sanitary conveniences would you recommend (*a*) for a village which is a special scavenging district, and (*b*) for one which is not?"

Answer.—In the unsatisfactory state of the law as at present, under the Public Health (Scotland) Act, 1897, (see Query No. 1051), it appears to us that while a Local Authority may recommend the provision of sanitary conveniences, they are in the invidious position of being unable to enforce their recommendation, for they have no power to do so under the Act of 1897. However, when a supplementary Act is passed to enforce the provision of sanitary conveniences we should recommend, in (*a*) privies or earth-closets with movable receptacles and portable ashbins, and in (*b*) privies or earth-closets with fixed receptacles which shall also serve as ashbins or ashpits. The capacity of fixed ashpits should not exceed eight cubic feet. The floor of the ashpit should be constructed of cement concrete, and should be 3in. above the level of the external ground, and the ashpit should be properly ventilated and provided with roof and impervious walls.

1053.—Sanitary Institute and Surveyors' Exams.—"Inquirer" writes:—"What are the necessary steps to take to become a member of the Sanitary Institute? Also if any examination is necessary, where is it held, and what are the fees for same? At the same time will you also give me some details as regards Institute of Surveyors?"

Answer.—The qualifications necessary for candidates for membership of the Sanitary Institute are that he shall be either (1) a Medical Officer of Health, or (2) hold the certificate of Surveyor or that in Practical Sanitary Science from the Sanitary Institute, or (3) be a Surveyor holding an appointment under a Parliamentary Sanitary Authority and a member or associate member of the Institution of Civil Engineers. The fees for the examination in practical sanitary science are £3 3s. when the examination is held in London, and £4 4s. when held out of London. We published the dates of forthcoming examinations in our answer to Query No. 1045 in our issue of April 22nd. Examinations for Surveyors are held by the Incorporated Association of Municipal and County Engineers (Secretary, Thos. Cole, 11, Victoria-street, Westminster, S.W.), and by the Surveyors' Institution (Secretary, Julian C. Rogers, Savoy-street, Victoria Embankment, London, W.C.). Information respecting the examinations may be had from the secretaries.

1054.—Building Bye-laws: Plans of Proposed Buildings.—"Nemo" writes:—"I submit sketch (not reproduced) showing proposed houses, and shall be glad to know if they can be approved as in accordance with the Bye-laws as to New Streets and Buildings, a copy of which I enclose."

Answer.—Our correspondent submits a block plan not drawn to scale, and does not show how many houses are to be built in the block, nor which is the intended front, side, or back of the houses. The sketch has been lettered, showing that on one side of the block is an 18ft. back street, on another side "8ft. path," and on a third side "proposed path." We trust correspondents will be careful to send us adequate particulars or we cannot advise them satisfactorily. The information now furnished is highly inadequate. Plans of the ground floor and backyards (if any) should have been sent. With such particulars as those given us we, however, think it will be found that the proposed houses could not be erected so as to comply with Clause 45 of the Bye-laws, and the plans should be disapproved in consequence.

1055.—Houses Built alongside an Old Highway: Bye-Laws as to Width.—"Scotia" writes:—"A person proposes to erect four houses alongside a country lane. There are already several isolated houses. The lane is only 18ft. wide. Could we insist on the four houses being set back, to allow for a 36ft. street? If we set these back, the road would still be only 18ft. wide on each side of these houses."

Answer.—It is a question of fact, as we have previously pointed out (Query 1033, April 8th), as to when an old lane or highway becomes a new street. Under any circumstances the owner can only be required to set back his forecourt wall (if such is to be provided) or the main front wall of his building 18ft. from the centre of the old lane or highway, when the Building Bye-laws prescribe the width of new streets to be 36ft. In the present instance we think it is very doubtful whether a new street is being formed. The facts are insufficient for us to more definitely advise.

1056.—Sewers: Local Authority cannot be required to Extend to every Block of Houses.—"Scissors" writes.—"Has there ever been a case decided that an Urban District Council is compelled to take a sewer up to a block of property and along a main road not previously sewered? If so, will you kindly give particulars? Will you also please give your opinion in regard to the following:—A new building is proposed to be erected abutting on a main road, which is not sewered. The proposed new building is 170ft. distance from the nearest sewer. (1) Is the Council compelled to extend the sewer up to the proposed new building? (2) Is the Council compelled to take it to within 100ft.? (3) Is it compulsory for the Council to sewer at all for this new building? (4) Has the fact that the new building is on a main road any bearing on its being sewered? (5) Can any property owners who have laid a sewer along a highway or main road recover the cost from the Council under any conditions?"

Answer.—We do not know of any decided case on the subject. (1) The Council cannot be required to provide a sewer for every individual house or block of houses within their district. (2) No; but the owner of the proposed house cannot be required to connect his drains to a sewer when this is more than 100ft. distant from the site of the house. He may, however, be required to construct a cesspool and connect his drains thereto (see Sec. 25 of the Public Health Act, 1875). (3) No; the Authority may, if they so decide, extend the sewer so as to bring it within 100ft. of the site of the house, and as the Sanitary Authority this course should be taken in preference to requiring the construction of a cesspool. (4) None whatever. (5) No; such sewers vest in the Local Authority immediately they are constructed under the provisions of Secs. 4, 13, 15, and 19 of the Public Health Act, 1875, and the Authority cannot be required to make any money payment for them.

1057.—Offensive Drains and Water-closets Inside Bakehouses: Proceedings.—"Bakehouse" writes:—"I shall be glad if you will kindly inform me under what Act and section notice is to be given for offensive drains and water-closets inside bakehouses?"

Answer.—It is an offence under Sec. 15 of the Factory and Workshop Act, 1883, to let or suffer to be occupied as a bakehouse, or to occupy as a bakehouse, any room or place which was not so let or occupied before the first day of June, 1883, unless the following regulations are complied with:—(1) No water-closet, earth-closet, privy, or ashpit shall be within or communicate directly with the bakehouse. (2) Any cistern for supplying water to the bakehouse shall be separate and distinct from any cistern

for supplying water to a water-closet. (3) No drain or pipe for carrying off fæcal or sewage matter shall have an opening within the bakehouse. And any person who lets or suffers to be occupied, &c., a bakehouse in contravention of this section shall be liable to a penalty of 40s., &c. If the above regulations are contravened, legal proceedings may be taken without first serving a notice. We recommend, however, that, previous to such proceedings being instituted, the owner or occupier be required by written notice to comply with the regulations, failing which the Local Authority should authorise their Medical Officer of Health, as provided by Sec. 17 of the Act, to institute proceedings.

1058.—SUN-BLINDS OVERHANGING FOOTWAYS: STATUTE AFFECTING.—"A. T. A." writes:—"Is there any Act in force to compel shopkeepers to keep their sun-blinds a certain height from the pavement?"

Answer.—The provisions of the Towns Police Clauses Act, 1847, Sec. 28, Clause 13, apply to the case, and precribes, *inter alia*, that a person who places any blind, shade, or other projection over or along any footway, unless the blind, &c., is 8ft. in height at least in every part thereof from the ground, shall be liable to a penalty of 40s. per day, &c. The provisions of this Act are incorporated, so far as relates to urban districts only, with the Public Health Act, 1875, by Sec. 171 of the later Act. A Rural Authority may, however, be invested with urban powers as above, under Sec. 76 of the Act of 1875.

1059.—DUTIES OF OFFICER: TAKING METER RECORDS.—"A. T. A." writes:—"Is it part of a surveyor's duty to inspect and take the readings of meters every month, or should this be the duty of the lamplighter? The gas is supplied by a company, and the Council wishes to check the meters with the company's account every month."

Answer.—We do not understand what meter readings are intended or suggested to be taken. If they are the street lamp meters, we consider it to be the duty of the surveyor to supervise the taking of the meter readings; and it is his duty to check the accounts and certify to their accuracy or otherwise before presenting them to his Council or Committee for payment.

1060.—BIOLOGICAL FILTERS: PLANS FOR.—"Nemo" writes:—"I shall be pleased to have your opinion on the plan submitted for filters for sewage from a pair of semi-detached villas. Would No. 1 or No. 2 plan be the best? I do not propose duplicate tanks, as there will be eight hours' certain rest each twenty-four hours, besides many intervals of rest during the day."

Answer.—The plan, not reproduced, shows in scheme No. 1 a proposed coarse bacteria filter, with outlet on the top of the filter. As we pointed out in reply to a similar query, No. 1043, in our issue of April 22nd, such a mode of construction would result in failure. Scheme No. 2 shows the effluent drain leading from the bottom of the coarse and fine-grain filters, and is much more practicable. But the proposed method of application of the sewage, which would really be on the continuous system, would not produce satisfactory results. We have repeatedly pointed out, in reply to similar queries, that the application of the sewage must be intermittent, and so arranged that the filter must be provided with a valve on the drain leading from the bottom of the filter, which should be closed while the filter is being charged, and so that the sewage may be confined for two or more hours therein and then drawn off, leaving the filter perfectly at rest for

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BELFAST.—May 5th.—Waterworks—Mr. Richard Hamilton, secretary, Waterworks Office, Belfast.

RUNCORN. — May 6th. — Extension of Sewerage Works.—Mr. William Diggle, Holly Bank, Frodsham.

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ARTICLE No. 6.

ITS ADVANTAGES OVER TEA AND COFFEE.

COCOA has been so long before the public, and is so largely used as a beverage in various forms, in some of which the fat is removed, and in others in which the fat is not only removed but starch is added; and others, again, in the forms of highly flavoured and sweetened chocolate, that it is not surprising attempts should be made to still further improve it. The modern crusade against alcoholic liquors has led to the disuse of malt and hops, in the form of drinks, by a very large number of persons to whom these products would prove valuable from the point of view of health. The valuable property possessed by malt of aiding the digestion of starch and of starchy matters by means of the diastase it contains, has received general recognition by the public as well as by the medical profession, in the extensive use that is made of extract of malt. A few preparations containing hops in the form of a beverage suitable for temperance advocates have also been introduced. But it remained for Dr. Tibbles to suggest the addition of these two important and valuable substances to cocoa, so as to form a non-alcoholic domestic beverage.

It would not be convenient to add them to coffee, since they can only be conveniently added in the form of powder, and as coffee is generally preferred in the freshly ground state, they would have to be added at the time of preparing it.

It would be equally difficult to add them to tea so as to form a uniform mixture. With cocoa they can be added mixed in any proportions; but it is only in a certain definite quantity that they can be added, so that the bitterness of the hop does not form a prominent feature and interfere with the delicate aroma of the cocoa.

Both tea and coffee contain caffeine as the active principle, but also small quantities of volatile substances, which in some constitutions cause unpleasant symptoms. Thus tea, especially Indian and Ceylon tea, produces in some persons a nervous or tremulous sensation, also symptoms resembling gastric catarrh, and in other cases extreme sleeplessness. Coffee, on the other hand, produces constipation, and in others the reverse.

There are other beverages containing caffeine largely used in other parts of the world, such as Paraguay tea, and guarana in Brazil and Central South America generally, which do not meet with acceptance with Europeans, who need to become gradually accustomed to their use. In Central and Northern Africa the kola nut is similarly employed. All these contain the same active principle, caffeine. It appears, therefore, that in tropical regions, where there is less inclination to a healthy amount of exercise than in colder climates, human nature instinctively craves for some stimulant that will produce the same effect as exercise, viz., to increase the circulation. Caffeine does this by stimulating the action of the heart. In populous countries where a large proportion of the population are engaged in sedentary work, or work which prevents a healthy amount of exercise in the open air, the same necessity for such a stimulant exists. Kola is without the fragrance of coffee or the aroma of tea.

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"The West African carriers at this port, who use Cola, and carry the bean wrapped in banana leaves about their person, are, as a whole, not, physically speaking, superior men to the Brazilian negro; and yet the African, through constantly masticating Kola, can withstand and endure labour and fatigue which no Brazilian carrier can withstand; and where, for instance, it takes eight Brazilian negroes to carry a load with difficulty, four African porters carry it cheerfully almost always, even though ascending a hill, singing and chanting the whole time as they trudge along, but never without a bit of Kola bean in their mouths; and as the discharging of vessels is paid by weight as a rule, the African gangs, who have less hands, earn twice as much; and while they hoard and save, the Brazilian porter lives from hand to mouth, spending in rum, under the impresston that it tends to strength, three times the amount that the African lays out daily in Kola beans, which are not intoxicating and in no way injurious, but act as a nutritive, and although not stimulant, yet produce vigour and freshness."

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THE

Sanitary Record,

MAY 6, 1898.

THE REPORT OF THE TUBERCULOSIS COMMISSION.

THE issue of the long-expected report of the Royal Commission on Tuberculosis overshadows in interest and importance all the other sanitary news of the past few days. It is an epoch-making document, and is certain to be followed by legislation at no distant date. This is the third Commission that we have had within the last ten years to inquire into the subject. The last was the Royal Commission of 1890, which established the foundations of our knowledge as to the relation between tuberculosis in man and the means by which it is imported through the flesh and milk of tubercular animals. Once the conditions that governed and gave rise to the disease were known,

the next step was to determine the practical measures that might be adopted to protect humanity from this insidious foe by the regulation of food supplies, and this is the task which the present Commission has been engaged in during the past two years. The inquiry has been a most exhaustive one, and the report and recommendations embody the most up-to-date knowledge that is obtainable both in this country and on the Continent as to the administrative procedure that is best calculated to prevent or to check the spread of tubercle in man and in cattle.

Owing to the lack of accurate statistics, the Commission are unable to specify the exact prevalence of the disease among British cattle, but they are clear that it is much more widespread than is generally supposed; and they find that it exists to a far greater extent among cows than other bovines, principally on account of their greater age, their close confinement, the severe drain caused by milking, and the common practice of maintaining a high temperature in byres, which is rarely associated with efficient ventilation. They also corroborate the report of the previous Commission in finding that, while there is always a certain amount of danger in consuming the flesh of tuberculous animals, the danger in regard to milk is far greater, milk containing tubercular matter being indeed the principal source of infection. The danger is greatest when the udder is affected; but as it is often difficult to detect the pressure of tubercle in the udder during the earlier stages, and as the spread of the disease in the udder is very rapid, the practical conclusion is that no tuberculous animal of any kind should be allowed in the dairy. There are also findings with regard to meat inspection, which they hold to be unsatisfactory, on account of its being entrusted to men without special training, and hence there is a total absence of uniformity; with regard to milk inspection, which they find to be non-existent; with regard to the use of tuberculin, which they are satisfied is an almost infallible test for tuberculosis in the hands of a competent veterinary surgeon; with regard to compensation, and a number of other matters.

Coming now to the recommendations appended to the report, we find these divided into two groups—those relating to meat, and those relating to milk. The recommendations as to meat aim at two things: (1) the suppression of all private slaughter-houses, all meat being dealt with in public slaughter-houses, where it can be properly inspected by duly qualified Inspectors; and (2) that the important duty of meat inspection shall be entrusted only to such men as have passed a qualifying examination in certain specified subjects. They need not necessarily be veterinary surgeons, though it is probable that the veterinary colleges will claim that they should be. The duties of Meat Inspectors, it is proposed, should be regulated from time to time by instructions from the Local Government Board; but pending the issue of such instructions, certain principles are laid down for their guidance in the inspection of carcases and the seizure of unsound meat. In many cases, the carcase, if generally healthy though locally affected, need not be condemned, only those parts that contain tuberculous lesions being liable to seizure.

The chief recommendation to secure the purity of milk is that notification of every disease in the udder should be made compulsory, under penalty, on the owners of all cows; and this is followed by a recommendation that Local Authorities should be invested with powers of systematic inspection and analysis. Medical Officers should also be empowered to suspend the milk of any suspected cow, and to prohibit the sale of milk from a cow with a diseased udder. Then come important recommendations with regard to the regulation of cowsheds and byres. Certain leading principles are laid down under this heading, including the provision of proper water supply and drainage facilities, of a minimum cubic space of from 600ft. to 800ft., and a minimum floor space of 50ft. for each adult beast, and of sufficient light and ventilation, the last named being the most essential requirements. These requirements are directed chiefly to dairy accommodation in populous districts; the conditions in rural districts vary so widely with local circumstances that no minimum cubic space can be specified, the one end to be kept in view being the maintenance of reasonable ventilation without draughts.

All these precautions, however, are recognised to be but temporary and uncertain palliatives so long as no attempt is made to eliminate the disease from the animals themselves, and this part of the inquiry may therefore be regarded as the groundwork of the whole. The Commission are of opinion that if the tuberculin test is skilfully applied, and the animals which react are carefully separated from the healthy ones, the disease may be reduced to small proportions in a limited time and at a moderate expense. The precedent set them by the Danish Government forms the basis of their recommendation that funds should be placed at the disposal of the Board of Agriculture for the preparation of commercial tuberculin, and that stockowners should be encouraged to test their animals by the offer of a gratuitous supply of tuberculin and the gratuitous services of a veterinary surgeon to see the test applied. This offer is, however, to be conditional on the owners undertaking to isolate reacting animals from healthy ones, and to keep their stock under satisfactory sanitary conditions, especially in regard to air space, light, and ventilation. In Denmark the results of the Government's experiment have been most encouraging, and if similar results are obtained in this country we may hope to see our agriculturists gradually eliminating the scourge of tuberculosis from their herds, and enabling us to look forward to the day when we may be able to check the spread of the disease among mankind.

Notes.

Outbreak of the Plague in Calcutta.

It is evident to those who follow with interest the course of public health in the world, that so far from there being any sign of the end of the plague in India, we are apparently on the eve of a fresh outbreak, which there is only too much reason to fear may prove more disastrous in its results than that which has scourged Bombay for the past eighteen months. From the first the

danger of the epidemic spreading through India was foreseen and guarded against; the most careful precautions were taken to draw close the sanitary cordon round Bombay; and hitherto these efforts have met with the most gratifying success, so much so that the disease has been almost entirely confined to Bombay and the outlying districts. But now comes the news that it has broken out in Calcutta. Several suspicious cases of illness having occurred there, cultures of the bacilli have been sent to Bombay to be examined by Professor Haffkine, and have been pronounced by him to be those of bubonic plague. There seems to be no doubt as to the correctness of the report, and it is further stated that the inhabitants have already taken fright, and the exodus among the wealthier natives, at least, has commenced.

The Sanitary Conditions of Calcutta.

This is most disquieting news, though it cannot be said that it occasions us much surprise. It would have been surprising indeed if, after the long-continued ravages of the plague in western India, it should never have found its way to the eastern side of the peninsula. None the less, however, is it a matter for deep regret that this terrible scourge should have made its appearance in the densely-populated presidency of Bengal. It is said that the sanitation of Calcutta is superior in some respects to that of Bombay; but that is not saying much, and it cannot be forgotten that it is not long since the Lieutenant-Governor had to formulate a proposal for the reconstruction of the municipality, on the ground that the Local Authority had failed to discharge its sanitary obligations effectually. The situation of the town, too, one would imagine, is less favourable than that of Bombay, as the latter place is insular, and has the advantage of being swept by fresh breezes from the Indian Ocean. On the whole, we believe that the conditions in Calcutta indicate that if the plague once gains a footing there it will be extremely hard to eradicate, and will, before it is over, occasion incalculable havoc and loss to the city, both in life and in trade, perhaps more so even than in Bombay.

Lessons for the Administration.

In facing at the outset the question of what preventive measures should be taken, the Government have for their guidance as an object lesson the experience of Bombay. And the one clear lesson that has been so gained is, that where sanitary issues are involved, the native rulers, who form the Local Authority, are not to be relied on. The Oriental mind seems unable to grasp those elementary principles of hygiene which are now so familiar to us Europeans. With them it is certainly true that cleanliness is next to godliness, but, unfortunately, with their notions of godliness, these two principles are frequently brought into hopeless collision. We think, then, that it would be wise for the Government to follow the advice that has been urged upon them, to supersede entirely the Municipal Authority in all questions of sanitary administration, and to place the sole responsibility in the hands of a specially organised department, and, above all, to be determined from the first firmly and consistently to enforce the sanitary regulations that the situation requires, even in the face of native hostility and prejudice.

The London Improvement Bill.

When we discussed, some time ago, the principal issues raised by the Bill promoted by a London Syndicate for the improvement of Westminster, we indicated our objections to the measure as it was framed, the leading one being that it was manifestly being run as a commercial and speculative undertaking; and was not likely, therefore, to conduce to the *real* improvement of the district, which, as it stands, is dear to many persons on æsthetic grounds, or on account of historical associations. The objectionable character of the Bill was fairly well indicated by the division in the House of Commons last week, when it was rejected by a vote of 336 to 84. At the same time, as we have already pointed out, it does not follow that because this particular measure is condemned, all attempts to improve the sides of the Thames, or the approaches to the Houses of Parliament, are subject to a like fate. On the contrary, there is abundant room for such alteration as, without robbing the locality of any of its beauty, would rather adorn it; and certainly improve it from a sanitary point of view. Such an improvement will probably come some day; but it will be a large undertaking, and will have to be at the public expense, as it will most certainly not be a dividend-paying venture.

The Electrical Energy Inquiry.

The inquiry that is being conducted by the Joint-Committee of the two Houses of Parliament into the subject of electrical energy, its generation and supply, will, it is to be hoped, result in considerable amendments of the law, which will still further stimulate the development of this great industry, and help to bring electricity, both as a motor and as a lighting agent, yet more within the reach of every one. It is not exactly creditable to this country that we should lag so far behind continental nations in this matter of electrical supply; and there is no reason why it should be so. But at present electrical companies and corporations feel themselves rather hampered in some respects by the existing state of the law; and perhaps this is, to a certain extent, accountable for our backward position. Among the amendments of the law that have been urged before the Parliamentary Committee, two of the principal ones are (1) the necessity for conferring on electric supply companies compulsory powers for the acquisition of land; and (2) power to go outside the area of distribution for the erection of generating stations, possibly having one large central generating station, from which the various districts of distribution would be supplied. The only difficulty with regard to the latter proposal was pointed out by Sir Courtenay Boyle, of the Board of Trade, when he indicated the conflict of authority that might thereby arise; and especially when the time came for purchase by the Local Authority. Apart from this difficulty, however, it was admitted that both proposals would help to solve many troublesome problems.

The Question of Long-distance Distribution.

An interesting issue was raised in connection with the question of long-distance distribution of electrical energy, which is an established fact on the Continent, while here it is still quite unknown. And yet Mr. Swinburne, vice-president of the Institution of Electrical Engineers, bore emphatic testimony to its advantages, both in the way of convenience and of cheapness. He said that the adoption of this system would enable small villages and scattered districts which could not afford to have their own gasworks to have the electric light, for, if they were on the route of the electric main, they would be able to utilise the supply without the necessity for finding the capital necessary for the construction of central generating stations. And not only so, but it would be found that it would pay. Of course, the same source of electrical energy that could be utilised for the lighting of a village could also be used as a motor power, and Mr. Swinburne placed before the Committee a most attractive picture of what might be expected in this direction. There was, in his opinion, no practical objection to every small cottage in the country being supplied with its motor, under a properly devised scheme, capable of being applied with facility to a variety of beneficial purposes in the household and on the farm. In Germany, indeed, some advance towards this consummation has already been made; and if it has been shown to be possible there, why not here, too?

"Fair Wages" Conditions in Contracts of Urban Sanitary Authorities.

An interesting Parliamentary Return has been issued by the Local Government Board for the purpose of showing the practice of the various Urban Sanitary Authorities throughout England and Wales with regard to conditions of employment inserted in their contracts for the execution of public works. The growth of the spirit which is the underlying principle of trades unionism has led many public bodies, especially in the larger centres of population, where the labour question is more prominent, to impose certain conditions on contractors, either as to the wages paid by them to their employés, or as to the other terms of employment. An analysis of this return shows in a tabular form how far such conditions attaching to public contracts are insisted on in the different Urban Sanitary Districts, and for this purpose the districts are divided into (1) County Boroughs; (2) Non-County Boroughs; and (3) Other Urban Districts, the population represented being stated in every case.

How Enteric Fever is Spread.

We have before us the report of some investigations into the aërial transmission of enteric fever, which seem to establish that the bacillus of this disease may live for a considerable time in arable and other soils, and even in ordinary dust, as it always contains a certain degree of moisture which enables it to exist in the most unlikely conditions. The possibility of the bacillus being found in an active state in such circumstances leads to the further conclusion that the poison of enteric fever may be spread by currents of air carrying the infected particles of dust, and depositing them on articles of food, which provide excellent lodgment for the bacillus, and at once become fresh centres of infection. An outbreak of enteric fever among our soldiers during the Egyptian campaign of 1885 is believed to have been thus caused. It has also been found that the turning up of the earth of a back court, for repair of the drains, may, especially in dry weather, lead to similar disastrous results. One practical deduction to be drawn from this knowledge is that, as the earth of back courts in the poorer districts of a town is always liable to a considerable amount of organic fouling, such back courts should be provided with impervious pavements, which not only prevent absorption, but are also easily cleansed; and another is that in enteric districts the pavements should be repeatedly scavenged with a plentiful use of water. Every means, in short, should be adopted to prevent the lodgment of the bacilli in the soil.

Analysis of the Conditions.

The conditions imposed on contractors naturally vary very widely, but they may be broadly grouped under five headings—at least those that relate to the rate of wages specified in the contracts. The rates may be specified as (1) those current in the district; (2) those recognised by trade unions; (3) those agreed on by associations of employers and employed; (4) those prevailing or recognised at the date of the contract; or (5) those fixed in the contract itself. Besides these we find various conditions imposed as to the terms of employment, other than the rate of wages. Some Authorities indicate what these conditions should be without making them part of the contract; others are silent on the subject; and a few, chiefly in the smaller districts, dispense with formal contracts altogether. Now, of the 1086 urban districts which the return covers, representing a population of about seventeen millions (London being excluded), it appears that 912 districts, with a population of eight millions, leave their contractors unfettered in the matter of wages to be paid to their employés; while 163 districts, with a population of nine millions, lay down what the terms of employment are to be; and 11, representing a population of half a million, though indicating them, do not make them binding. It is to be observed that these conditions are chiefly to be found in the contracts of the larger urban districts, such as the county boroughs, the greatest freedom prevailing in the smaller centres. Another feature to be noted is that where the rate of wages is specified, in by far the majority of cases, it is the rate "current in the district." If we add London we find that the urban districts of England and Wales, with a total population of about twenty-one millions, may be divided into two classes, of which the first, with an aggregate population of about thirteen millions, includes all districts of which the Local Authorities impose conditions of some kind as to wages in their contracts; and the second, with a population of about eight millions, includes those which dispense with such conditions.

Mr. T. McKinnon Wood, Chairman of the London County Council, has been entertained at dinner by the members of the Old Millhillian Club.

LIME, MORTAR, AND CEMENT: THEIR COMPOSITION AND ANALYSES.

By W. J. DIBDIN, F.I.C., F.C.S., &c.

CHAPTER II.

CLAYS AND SANDS.

Clay.—On turning to the subject "clay" in any work on chemistry, we shall find that the description of clay comes under the head of "alumina," which in the form of silicate is the constituent of an enormous number of rocks, *e.g.*, the felspars, amongst which may be mentioned irthoclase (K_2 Al_2 Si_6 O8), lencite (K_2 Al_2 Si_4 O_{12}), sodalite (2 Na Cl3 Na_2 Al_2 Si_2 O8), and albite (Na_2 Al_2 Si_6O_{16}). The various felspars and micas (also aluminium silicates), together with quartz, &c., constitute primary rocks, such as granite, gneiss, syenite, porphyry, &c., mica being a constituent of slate. The felspars by natural disintegration give rise to various clays, the purest forms of which, such as kaolin, or white china clay, pipe clay, fullers' earth, &c., correspond more or less to the composition $Al_2O_3, 2Si\,O_2, 2H_2O$; white marl, loam, &c., are classes containing various admixtures, such as calcium carbonate, oxides of iron, and magnesia, &c.

These primary considerations clearly show us that clay is a compound of alumina (oxide of aluminium) with silica (oxide of silicon), the latter of which we know in its natural state, in a considerable degree of purity, as flint. The practical classification of brick earths involves a curious contradiction of terms in the case of pure clays composed of silicate of alumina with but a small proportion of lime, magnesia, soda, or other salts, these being known to the brickmaker as "foul clays." Loams, or mild clays, consist of clay and sand, and are sometimes called "sandy clays." Marl, or calcareous clays, contain a large proportion of carbonate of calcium. Malm is an artificial imitation of natural marl, and is made by mixing clay and chalk in a wash mill, and is sometimes called "washed clay."

It will not be without interest to follow the formation of clay from the decomposition of the rocks from which it is derived. Thus, in the original rock formation, we have the substances in their crystalline state. By the action of weathering these become broken down, and gradually washed away by the rain and carried into the embouchures of the rivers wherein they are deposited. As the rapidity of the current decreases, first the heavier particles fall, and these form the sands; then the next form the lighter sands and loams; and as the rapidity of movement of the water decreases still further, the almost impalpable fine particles settle and form the clay beds. Thus it is evident that the character of the various deposits will give a true indication of the kind of rock from which they were originally derived. Thus the granite rocks produce a sand the principal ingredients in which are quartz, felspar, and mica. The volcanic rocks are represented by sands, in which lava, obsidian, &c., appear. The flat, soft-grained sands arise from the disintegration of the schistose rocks; the calcareous rocks, as might be expected from their soft nature, are those which are least represented in the series, unless in the case of the siliceous sands arising from the comminution of the flints so plentiful in some of the secondary formations.

The mineralogical characteristics of these substances are of considerable interest, and their appearance under microscopical examination will tend to show their specific differences in a very clear light. Mica in thin plates, some colourless, some dark colour, and some green.

Quartz sand is made up either of entire crystals or of fragments of crystals, so that each particular grain has one certain optical structure. A grain of quartz sand examined by polarised light under the microscope will appear to be black when the two prisms of the polariscope and the grain of quartz are in a certain position to one another. It is not shown on the field of the microscope, because the axes of depolarisation are parallel. As the quartz is rotated on its axes, without the prisms being altered in their position, it becomes brilliantly illuminated and coloured with all the prismatic colours, and as the rotation is continued these subside and the quartz is once more in darkness; and this alternation of brilliant illumination and invisible darkness continues as the continued rotation brings the axes of polarisation parallel or not with that of the prisms of the polariscope.

Flint is made up of a great many very small crystals, and when it is seen in polarised light it looks mottled. The difference between the two is the difference between a great bit of granite and a piece of coloured glass. On the whole, the flint would look mottled, with black and white all over. The bright colours are not seen, because the size of the individual crystals is not sufficiently great to produce interference of a high order to give any colour. In a hundred grains or so one might be met with which would cause doubt, but the differences between the quartz sand and flint sand is as well marked as the difference between sheep and goats (Sorby).

Sand.—We may now consider the sands in much the same way as that in which we have glanced at the clays. Next to oxygen silicon is the most abundantly-occurring and widely-diffused element known. It does not occur in a free state, but always in combination with oxygen, thus (SiO_2) or silica, as mentioned above, which substance either alone or in combination with various metals, forms an immense series of well-known and widely-distributed minerals, the following being some of the natural forms in which it is found:—

Natural Forms of Silica (SiO_2).

Quartz, or rock crystal.	Opal.
Amethyst.	Jasper.
Agate.	Flints.
Chalcedony.	Sand.
Onyx.	Sandstone.
Cornelian.	Infusorial earth.

The quartz and amethyst occur in well-shaped crystals belonging to the hexagonal system (six-sided prisms), agate and chalcedony are a mixture of crystallised and amorphous silica. The following compounds of silica are broadly classed as aluminic and magnesic silicates; but they mostly contain, in addition to these elements, sodium, potassium, calcium, iron, manganese, &c. Their chemical

formulæ are very varied and complicated, and by no means thoroughly known :—

SOME COMMON SILICATES.

Aluminic Silicates.	*Magnesic Silicates.*
Beryl.	Asbestos.
Clay.	Augite.
Felspar.	Hornblende.
Garnet.	Meerschaum.
Jade.	Olivine.
Lapus lazuli.	Stéatite (French chalk, soap-stone, &c.).
Mica.	
Pumice stone.	Talc.
Slate.	
Topaz.	

Technically, sand is known as "argillaceous," "siliceous," or "calcareous," according to its composition, and is procured from pits, rivers, sea shores, or by grinding sandstones. Pit sand has an angular grain and a rough surface, which is admirably adapted for mortar; but it often contains clay, and similar impurities. River sand is not so sharp or angular in its character, the grain having its points rounded and polished by attrition. It is commonly fine and white. Sea sand, for the same reason, is also deficient in sharpness, and it contains alkaline salts, and is said to cause permanent damp and efflorescence, or "saltpetreing," as it is termed.

In those deposits caused by rivers which have long ceased to flow, the sand is known under the name of "pit sand," to distinguish it from that borne down by the rivers called "river sand," and from "virgin sand," which remains in the place where it was formed. Pit sand is generally of a sharper and more angular grain than river sand; but in all other respects its composition is identical, excepting that it is occasionally stained by ochres or clays containing oxide of iron in more or less abundance.

The generally-received opinion that sand should be perfectly free from all earthy matters is only true to a certain extent. There exists a species of sand in very large masses in France, where it forms even entire hills, consisting of comminuted chalk in irregular grains, very unequal in size, and mingled with a clay, sometimes yellow, red, brown, or even white, in proportions varying from a quarter to three-quarters of the total volume. It is known under the name of "arcues," and is largely used in conjunction with the rich loam from river and waterworks. Some of the decomposed Granwacke rocks also yield an argillaceous sand, composed of quartz, schiste, felspar, and particles of mica, agglutinated by a species of clay, which is very valuable, whether used in its natural state or calcined to make artificial puzzolanos, like Arènes. The granite rocks of Devonshire, some parts of Brittany, and of the extreme North-West of Spain, all of which are characterised by a remarkable excess of felspar, yield a sand of great value for building purposes, especially when mortars composed of it are not immediately exposed to the effects of running water. In all probability the potash present in the decomposing felspar may influence, in the opinion of the late Mr. Burnell, the setting of the limes mixed with the sands thus obtained.

(*To be continued.*)

READJUSTMENT OF DISTRICTS.

By EDWARD F. WILLOUGHBY, M.D., D.P.H.

FROM the small progress as yet made in the business already before Parliament it seems highly probable that the Bill for the better government of London may not be even introduced during the present session, and should this be the case the mention of it in the Queen's Speech was, to say the least, inopportune, coming as it did on the eve of the County Council elections, when conjectures and assumptions as to its aims and scope gave rise to much party feeling and mutual recrimination. The only intimations given by those to whom alone its provisions are known relate to the proposed incorporation of the larger and more important of the London districts as municipalities with the organisation and powers belonging to such elsewhere, in the hope that the enhanced dignity of the local parliaments will have the effect of raising their tone and of attracting candidates of higher education and social position than the average Vestryman. If this be all, the fate of the Bill is to us a matter of indifference. For, in the absence of any qualification and with practically universal suffrage, we fail to see the virtue of a mere change of name, while the electors will not enjoy the freedom of choice they have in nominating as candidates for the School Board and County Council men of mark from outside their own district.

The amalgamation of the smaller districts, or their absorption in the larger, has been suggested as a corollary of the creation of municipalities, and is, to our mind, a matter of far greater urgency; but with it we should like to see a general reduction in the number of the representatives, as likely to do much towards making these assemblies more worthy of respect. But whether the new districts be more or fewer than at present, a readjustment of their boundaries is imperative in the interests of public health and effective administration. Save in inequality of area, population, and value, such parishes as Hackney, Islington, St. Pancras, Marylebone, Paddington, and Kensington are well enough; but while many in the East and South are too small, and, from the character of the population, are unfitted for self-government, the boundaries of a number in the W.C. and southern districts, are the reverse of "scientific," reminding one of the "dissected maps" that served for the instruction and amusement of our childhood. The way in which some—as the Strand, St. James', and St. Martin's-in-the-Fields—intersect and surround one another, the intrusion of the three or four detached portions of extra metropolitan South Hornsey within the metropolitan area, the fragments of Chelsea at Kensall Green, and of Kensington in Chelsea, on the banks of the Thames, of Woolwich, on the north of the river, and of Clerkenwell far away in Hornsey, are simply ridiculous, and call for rectification by the strong hand of Parliament, since experience has shown in three, at least, of these instances, the futility of Local Government Board inquiries in the face of local prejudice and imaginary vested interests.

Another boundary question is that of the detached portions of counties, the most conspicuous example of which is furnished by Worcestershire, of which

about a dozen isolated fragments are scattered over the adjacent parts of Gloucestershire and Warwickshire, so that in a twenty-mile ride from Chipping Norton to Evesham, or from Stratford-on-Avon to Winchcomb, one might cross and re-cross the boundaries of Worcestershire several times in the hour. These islets are purely rural in character, they do not contain a single actual or potential centre of industry, and whatever the historical explanation of their origin, there can be no conceivable pretext for the preservation of this anomaly, while its continued existence cannot but present impediments in the way of effective administration; and we do not see what there is to prevent their absorption into the county within which they lie, an area of like character and equal rateable value contiguous to and preferably on some irregular part of the boundary being ceded in exchange.

Then there is the unfortunate difference between the sanitary and the registration districts into which the country is divided, and which seriously interferes with the main end and aim of registration, viz., the employment of statistics of population, births and deaths, for the purpose of gauging the public health. But the readjustment of the registration districts in accordance with those of the municipal and sanitary areas would involve no fiscal changes whatever. It would indeed interfere with comparisons between the past and future statistics of the districts concerned; but this would be once for all, whereas the inconvenience consequent on the inclusion of parts of a rural district within a city, or of the city in the adjoining rural district, involves a perpetual source of embarrassment to the statistician.

NOTES ON
PRACTICAL SANITARY SCIENCE.

By WILLIAM H. MAXWELL.

No. 58.—REFUSE DESTRUCTORS.

(*Continued from page* 418.)

Boulnois' and Brodie's Improved Charging Apparatus.—This invention has been successfully introduced as a labour-saving apparatus at the refuse destructor at Liverpool, and other places. It is illustrated in Fig. 31, and is shortly described as follows:—

This invention reduces the manual labour of charging to a minimum, regulates the charge, and lessens the possibility of nuisance or offence.

The apparatus consists of a wrought iron truck, 5ft. in width by 3ft. in depth, and of such length as will cause it to be of sufficient capacity to hold not less than twelve hours' supply for the two cells which it commands. This truck moves along a pair of rails laid across the top of the destructor, and is capable of being worked by one man. The truck is divided into compartments holding a charge in each, and provided with a pair of doors in the bottom opening downwards, which are supported by a series of small wheels running on a central rail. A special feeding opening in the reverberatory arch of the cell of the full width of the truck (5ft.), and placed immediately over the drying hearth, is constructed by a fire-brick arch fitted into a frame capable of being moved backwards and forwards by means of a lever arrangement.

The truck when empty is brought under the tipping platform, and the carts tip their contents directly into it, and when it is required to feed one of the cells the truck is moved along so that one of the divisions is immediately above the feeding opening, and the wheel holding up the bottom doors rests upon the central rail, which is continued over the movable covering arch. Then the movable arch, actuated by the lever, is rolled back, releasing the doors and discharging the contents into the cell, so that no handling of the refuse is required from tipping to feeding.

This arrangement provides portable storage for a large quantity of material, and entirely does away with the necessity for the shovelling and handling, which is not only very objectionable from a sanitary point of view, but also adds to the cost of destruction.

Writing upon the charging apparatus as installed at the Liverpool destructors, the City Engineer says,[142] "One of the many advantages claimed for the tank arrangement is that unlimited storage capacity can be provided, which is not the case in any other destructor; and it has been proved that a considerable saving in cost is effected by the introduction of the tanks."

This special form of cell also allows the gases and products of combustion to be drawn off evenly over the level bridge at the back of the cell, instead of at one corner, as in the ordinary Fryer's cell, and the application of these tanks and movable charging openings can be made to any form of cell now in use.

Fire-bars.—In addition to the ordinary type of stationary fire-bar, there are several kinds of patent movable bars used in connection with destructor furnaces, although these are, as a rule, found to be of but doubtful advantage over the simple stationary type. Amongst the movable bars are the following:—

Settle's Patent Grate Bar[143] is illustrated in Fig. 32, from which it will be seen that a pivot is placed near one edge of each bar, so that they tilt upwards only in one direction, either forwards or backwards, as may be required. The bars are connected to rods, actuated by means of a hand lever, so that the movement of one rod tilts all the even bars and the movement of the other rod tilts all the odd bars. The even and odd bars can therefore be tilted alternately either by hand or automatically.

Each bar when tilted throws its fuel on to the next bar in succession, and, as the odd and even bars work alternately, whilst the intermediate bars remain stationary, the bars act as "carriers" as well as "rockers," and thus convey the clinkers and fuel either towards the bridge or towards the furnace doors as may be required, according to whether the bars are fixed with the pivots to the back edge or to the front. In the former case fuel fed on to the bars nearest the dead-plate will be gradually carried towards the bridge.

Vicars' Grate Bars[144] impart a forward motion to the fuel or refuse, and are actuated by machinery from a cam shaft.

Biddle's Rocking Bars,[145] Fig. 33. The fire-grate consists of a series of bars, of which each alternate

142 *The Surveyor*, April 9th, 1897.
143 Patent No. 15,482 (1885).
144 Patents No. 1955 (1867), and No. 378 (1879).
145 Patent No. 4896 (1891).

REFUSE DESTRUCTOR ACCESSORIES.

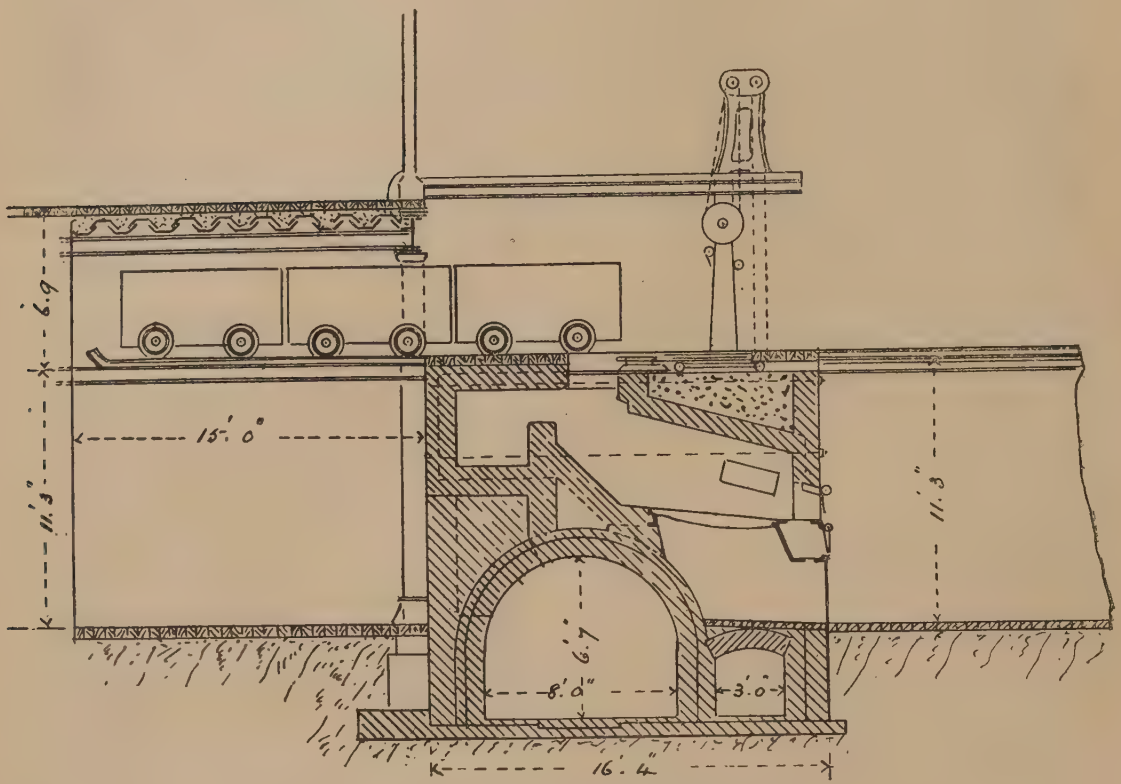


Fig. 31.—Boulnois and Brodie's Improved Charging Apparatus

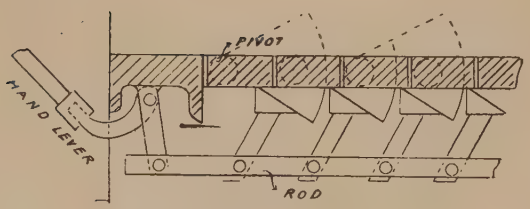
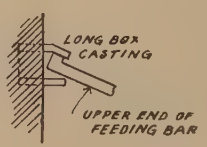


Fig. 32.—Settle's Patent Grate Bar.



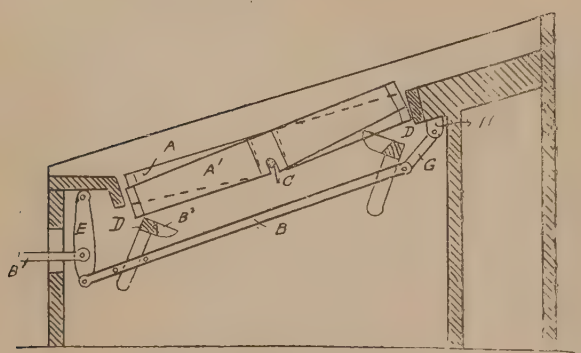


Fig. 33.—Biddle's Rocking Bars.

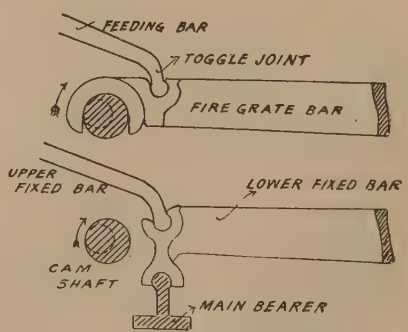


Fig. 34.—Henley's Movable Bars.

one is made to rock as shown in the diagram. A, stationary bar; A^1, rocking bar; C, a transverse rod upon which A and A^1 take a bearing centrally. The stationary bars A at each end take a bearing on the stops or lugs D, whilst the rocking bars can be moved at and through varying speeds and spaces. The bars are actuated by means of a lever B^1, connected through link E to the inclined rod B bearing the member B^2, which acts upon the bars as shown.

Horsfall's Self-feeding Apparatus.[146]—In one of Horsfall's "improved type" furnaces, at the bottom of the refuse hopper, there is a series of sliding plates, or "pushers," adapted to force the refuse forward on to the grate bars, which are of the moving or rocking type; and are usually constructed according to Settle's patent. The "pushers" extend the whole width of the furnace, and they are operated by means of eccentrics through eccentric straps and rods, the shaft on which the said eccentrics are mounted being rotated slowly from any suitable source of power. On the same shaft are also mounted cams, adapted to operate levers actuating the moving or rocking grate bars, through suitable links or rods. By the use of these pushers and moving or rocking grate bars, the refuse and clinker are gradually moved forward, so that the ashes and clinker are deposited on the front dead plate, from which they are removed at intervals through the furnace door.

Healey's Movable Bars.[147]—These are forwarding motion bars, fixed as shown in the illustration of Healey's furnace (Fig. 11), and are constructed as illustrated in the accompanying diagram (Fig. 34). Above the fire grate bars, which are fixed level, are small inclined feeding bars, the feet of which take their bearings in toggle or knuckle joints on the fire-grate bars. At the upper end of the inclined bars is a long box casting or carrier, in which the upper or fixed feed bars can expand, and the moving feed bars can reciprocate.

Healey's feeding and fire-grate gear is applicable to all kinds of furnaces in which refuse fuel is burnt, and his patent extends to the gearing of the motor[148] which drives the cam shaft for operating the bars.

(To be continued.)

THE SANITATION OF DOMESTIC BUILDINGS.

By Frank Latham, C.E., M. San. Inst., &c., Assistant Surveyor, Borough of Margate.

CHAPTER VII.

DRAIN TESTING.

Among the various descriptions of apparatus for the purposes of producing and applying the smoke for this test are the "Eclipse" drain-testing machine, the "Asphyxiator," Jones' patent, and the "Grahtryx," which are recommended for general use. The former (Fig. 90) is made by Messrs. Burn Brothers, and consists of a copper chamber containing the smoke-producing substance. Communicating with this chamber is a double-action bellows, by means of which the smoke is propelled and generated. An advantage in the use of this apparatus is that upon the tube of the chamber being applied to the drain, and all vents closed, should the cover of the chamber which is water sealed while the machine is actuated, become raised, and remain so, it will prove that the drain is air-tight.

The "Asphyxiator" (Fig. 91), made by Messrs. J. Watts and Co., consists of a combustion chamber containing the smoke-producing substance. This substance is kept alight, and the smoke therefrom discharged into the drain through

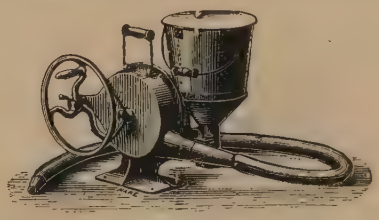


Fig. 91.

a flexible tube, by means of a revolving fan worked by a handle.

Jones' patent rotary-action smoke-generating machine (Fig. 92) is another good and compact tester, and is worked somewhat in the same manner as the "Asphyxiator," but is a later invention, the tubes being made with unions to fit Jones' patent drain stoppers. The

Fig. 94.

"Grahtryx" smoke machine, which is also an efficient tester. One of the best and strongest smelling substances used in the combustion chambers of smoke-testing machines is lighted oily engine waste or a mixture of sulphur and shavings. Smoke rockets (Fig. 94) such as Brock and Co.'s, Pain's, or Burnett's, which upon being lighted throw off thick volumes of sulphurous

Fig. 95.

Fig. 96.

fumes, are very useful and handy as drain testers.

After stopping up the vent pipes, three or four of these rockets should be placed in the lowest part of the drain, the fuse part foremost, and properly lighted, a stopper being immediately inserted in the opening in the drain.

Where the ordinary air inlet boxes are attached to drains the rockets can be lowered down the inlet pipe by a piece of cord, and when they have finished burning the stopper and rocket cases can be removed, and two buckets full of water discharged quickly down the pipe, which will drive

146 Patent No. 20,207 (1892).
147 Patent No. 18,398 (1892).
148 Healey's motor for bars, Patent No 12,990 (1892).

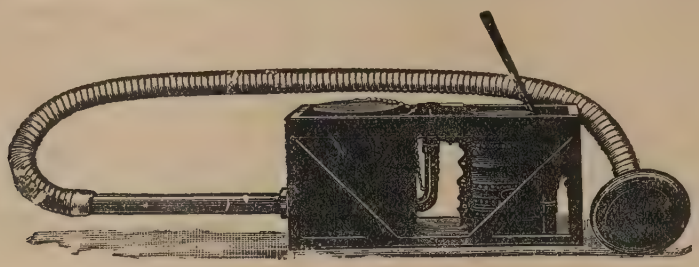


Fig. 90.

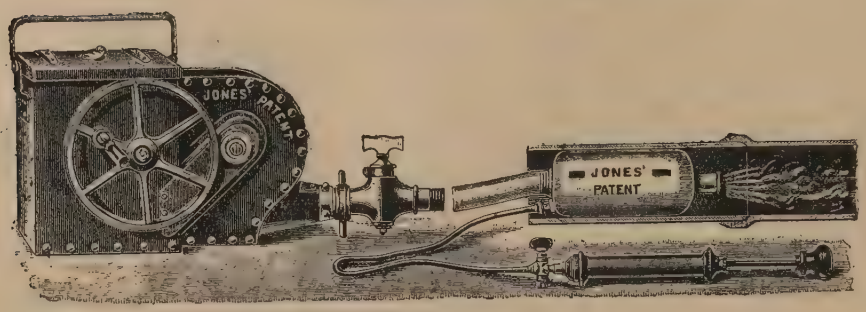


Fig. 92

the smoke through the drains. It is often necessary in using smoke rockets to open the outlet and inlet pipes for a short time to admit air before the smoke will pass through the drains.

Burnett's patent smoke tester (Fig. 95) is a satisfactory and convenient arrangement, it being on the same principle as the rocket, but can be inserted into the drain through the water of either a gully or water-closet trap. This is done with the assistance of a detachable wire handle, by which, upon the match being properly ignited, the tester is thrust through the water and the drain charged with a large volume of dark pungent smoke.

Smell tests for drains are sometimes used, more especially for testing the soundness of water-closets and other internal connections. The best for this purpose are chemical ones, the substance being packed ready for use in small air-tight tin spring boxes bound round with a long length of string (Fig. 96). The string upon being partly unwound and the end held, the tin box is placed in the trap and flushed into the drains, warm water being best for this purpose, which will unwind the remaining string, whereupon the contents of the box escapes into the drain, and throws off a very powerful and peculiar odour, which soon finds its way through any leaky joints or fractures and is easily detected. Some of the best of these are Kingzett's and the Sanitas Company's Improved, Burnett's patent, and Kemp's patent, all of which the writer finds to act very successfully

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Perth Consumptive Hospital.—New buildings are to be erected in connection with the Hillside Home, Perth. They comprise a men's hospital, a women's hospital, and an administrative block—all to be devoted exclusively to the treatment of consumptive patients. There are three blocks, the centre one being the administrative block, which contains kitchen, sculleries, store-room, larder, pantry, &c.

"PRACTICAL SMOKE PREVENTION."

By W. Nicholson, Smoke Inspector, Sheffield.

(*Concluded from page* 450.)

WHAT KIND OF FURNACES ARE WE SPEAKING ABOUT?

When we say heating furnaces it embraces many furnaces, very large and small, plate, guns, ingot, billet, ball, tire, axle, spring, sheet, air, annealing, hardening, and many other kinds of furnaces known by special names, almost numberless, but yet coming under the head of heating furnace.

There are three exceptions which we desire to take from this list, viz., thin sheet steel, annealing, and hardening furnaces, which are peculiar furnaces requiring little heat, smoke also, experienced men say, and much care in the working of them. Men who have worked this class of furnace between twenty and thirty years say, "The smoke gives temper and toughness to the steel, and without it the steel is unsuitable for the purpose required." This refers more especially to sheet mill furnaces. Even under these difficult conditions, the nuisance of black smoke can be reduced somewhat by having chimneys 80ft. high, and not 20ft., as the common custom is to-day. The draught difficulty could easily be overcome by having a separate damper for each furnace.

The special class of furnaces which we consider must be excepted will not at the very most reach 10 per cent. of the whole. Supposing we say 10 per cent., then there is 90 per cent. of the furnaces which can be dealt with, and from which, at the least, between 70 per cent. and 80 per cent. of smoke emitted could be practically prevented. I know many will say that is a very large order—smells of America—and is easily put on paper, but not so easy in practice.

HOW CAN IT BE DONE?

Some say by substituting gas. To work by gas will prevent the smoke, but to put down a gas

plant is very costly, and costly to work, especially if the furnaces are not required night and day; the producers are consuming coal all the time, wages paid, and many other items; but the greatest cost would be the reconstruction of all the furnaces, which would mean bankruptcy for many. So gas for the working of heating furnaces is suitable and successful in some cases, but is not in others, owing to the great cost and other impracticable things which prevent it from universal adoption.

FURNACE CHIMNEYS RAISED.

Many of the manufacturers are now discharging smoke from furnaces into their tall chimneys, which considerably minimises the nuisance, but the large majority of furnaces have very low chimneys. They ought to be raised considerably, the results would prove very satisfactory both to the manufacturer, the man who works the furnace, and from a public health point of view.

Most of the smoke can be practically prevented by sensible stoking. The present system of firing furnaces:—(1) They put on about three times more coal than they ought, to make it last. (2) They make up the door, or hole if there is no door, and thus exclude all air. (3) Anybody and everybody—lads often—fire the furnaces, with no knowledge or care in firing. With such senseless stoking we do not wonder at the volumes of smoke emitted. One man ought to be responsible for the firing of the furnaces, as men are responsible for the stoking of so many boilers, and should be made by strict supervision to prevent as far as practicable all black smoke. This can be done by carrying out the simple suggestion or rules laid down in this paper for the firing of boilers, which are four in number:—(1) Firing lightly; (2) firing oftener; (3) admitting the necessary air to the furnace; and (4) shutting it off when not necessary. Furnaces can be worked by these rules; in other words, by the same sensible stoking as boilers, with the same, or nearly so, satisfactory results. This is not simply speculation, but has been proved by experience in the working of these furnaces. I could give many instances, but three will suffice.

A man in one of our large firms had charge of a number of heating furnaces which were very large. The man whom he succeeded allowed the men under him to fire in their own slipshod fashion, but this man in question, being a thoughtful person, determined to fire the furnaces on a more scientific system, which was as follows:—Lighter fires, admitting a little air to cause combustion; and he told me "the results were most satisfactory." They got their heats hot quicker, consumed considerably less coal, and made very little smoke, which system, he said, only cost a little extra labour to the men.

ANNEALING FURNACES.

There are some annealing furnaces so constructed that the wire or special steel to be annealed is placed in boxes, or in other ways protected from the flame of the furnace. In this class of annealing furnace a dense black smoke can be practically prevented. We have often pointed this out to the men in charge, who have never attempted it, or even thought about it; and working on those suggestions, they have done more work with the furnace, and prevented those long and black emissions of smoke.

AIR FURNACES.

A class of furnace used for the melting of large lumps of metal. One day I saw a chimney belching forth black smoke for twenty minutes, without any cessation, and went into the works to inquire the cause. In company with the manager we found it was an air furnace. The man in charge had worked that furnace more than twenty years. He always put a very heavy fire on, and shut the door tightly, to keep out every bit of air. He was one of those men whose knowledge about working of air furnaces was perfect, and resented being taught by his manager or anybody else. He was told to fire lighter, admitting a little air, which he did; and was surprised at the result—no interference with the working of the furnace, increased heat, and very little black smoke.

I feel sure, with such practical demonstrations, the reader will agree with me that much can be done to practically prevent black smoke from heating furnaces.

If it were necessary I could give many more instances which are practical proofs that much of the dense black smoke from furnaces can be prevented by the application of a little common sense in firing, which only means a little extra labour on the part of the men in charge; but this is unnecessary, assured that sufficient has been said to satisfy the most sceptical on this point.

RESULT WILL BE RICHES.

In all our experiments and experiences we want the result to be riches—gain in some way or other. If we had no such policy or prospect, I feel sure we should seldom enter on the expedition. Most writers on this question have dealt very extensively on the blessings and benefits to be derived from the abolition of black smoke, so there is no necessity to cover the same ground as they; but just, in conclusion, let me draw attention to the public and personal benefits which will be obtained if the few practical and simple suggestions as set forth in this article be carried out in the working of boilers and furnaces.

(1) *Public health.*—The rich, after business hours, can leave the smoke-laden atmosphere, and go to pleasanter parts where the atmosphere is more bracing and beneficial. The poor man's lot is quite different. He is compelled to live near the large works, and in an atmosphere which is not healthy, so, on the ground of public health only, everything ought to be done that is practicable to make the air pure. But we must not forget that the working men, who are the greatest sufferers, have largely the remedy in their own hands, as they are the smoke makers, or can be the smoke preventers.

(2) *Personal health.*—This is a personal matter, and concerns everyone, because a man's health, in many instances, is his only wealth; so looking at the question from a selfish point of view, it behoves every man to play his part.

(3) *Financial benefits.*—The other benefits named may be considered indirect benefits, but there is also, beyond all question of doubt, a direct saving by practical smoke prevention, as many manufacturers have proved and are prepared to prove. This fact alone ought to be enough to make all concerned do their best in this matter to benefit themselves.

(1) *Cleanliness.*—There is no question about cleanliness by a diminution of black smoke. We

are all agreed that with less smoke there will be less dirt, less defacement of public and private buildings, less darkness, less washing and cleaning for the housewife, more sunshine, more pure air, and more pleasant surroundings.

This is no wandering of the imagination but what actually takes place when the pall of smoke is removed. Cleanliness, it is said, is next to godliness, and godliness is goodness, so if we desire to be good we must have cleanliness, and must procure it as far as practicable by preventing black smoke.

Black smoke does not end with dirt, it produces disease of a moral kind. I know many will say we are now plunging into the sea of sentimentalism, and making smoke responsible for things which it cannot produce; but let us look at the matter a little closer, and we shall find that many of the moral maladies are the creations or children of dirt.

How are these ailments of loss of life brought about? By dirt. It being continuous, they lose all spirit in trying to keep the house and the body clean; they become more dirty as days go on until they lose all sense of cleanliness, decency, and dignity of life; they become debased and demoralised; this demoralisation being contagious, it spreads rapidly, until all neighbourhoods are infected by it, which results in death to all that is good, great, and noble. Tracing it to its source, we are compelled to confess that black smoke or dirt is largely liable for some of the moral maladies humanity suffers from to-day.

If we desire a better moral tone, we must make the surroundings (where the great bulk of the people live) more sanitary and more smokeless. This is an individual work; every man must play his part by emitting as little dense smoke as possible from his own house chimney, helping and urging others who are in charge of boilers and furnaces to do the same. Then by one united action this great smoke-nuisance question will be solved, life will be more pleasant and profitable, and the solution will confer innumerable benefits and blessings on the world at large.

A SANITARY DRINKING FOUNTAIN.

DRINKING cups have been long recognised as a probable means of spreading diphtheria and other contagious diseases affecting the mouth and lips. In summing up the results of the medical inspection of the New York city schools for the quarter ending June 30th, 1897, the *Sanitarian* showed that of the 4183 children excluded from the public schools on account of sickness during that quarter, 265 were for diseases liable to be communicated by the use of the common drinking cup—diphtheria, croup, scarlet fever, whooping-cough, and mumps. Of other diseases, more or less liable to be spread by the same means, there were: cases of measles, 51; chicken-pox, 93; and contagious diseases of the eyes, 702.

In the same relation to adults—to all who use them—are the drinking cups and tumblers common to public places; railway stations, street drinking fountains, manufacturing establishments, &c., where persons afflicted with consumption, scrofulous and syphillitic diseases of the mouth and lips indiscriminately use such cups and glasses! The mere statement of the practice suggests its danger. And so, too, the railway drinking cups and glasses, which should be avoided as much as possible.

The drinking fountain illustrated herewith is an ingenious device recently invented by a citizen of Rochester, N.Y., which wholly supplants the use of cups and other drinking vessels in public places. It consists of a marble pedestal about 3½ft. high, capped with a funnel-shaped basin 12in. in diameter,

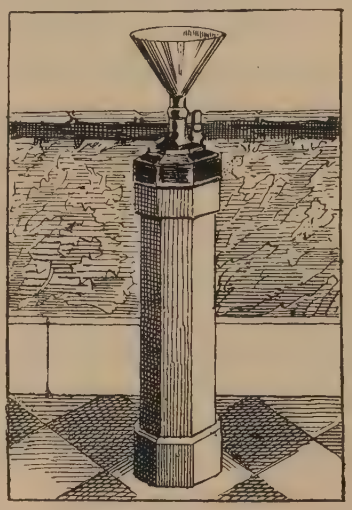

Fig. 1.

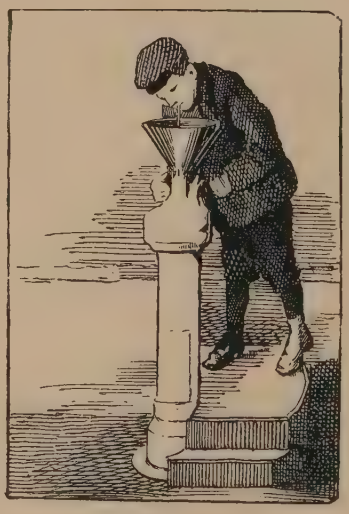

Fig. 2.

connected with the water supply. Upon pressure of a lever at the base of the basin a jet of water shoots up from the centre of the basin and into the mouth when held over, and from this—the jet being small and without spatter—with very little tact thirst may be abundantly satisfied without the intervention of a drinking vessel of any kind. It admits of no contact of the lips with the jet pipe or any other portion of the apparatus—the water flows from the supply pipe through the jet directly into the mouth; and all waste into the bowl im-

mediately flows off by an escape pipe—none is allowed to accumulate.

The fountain is highly commended by the Health Officer and members of the Board of Health of Rochester, and others who have examined it. A movement is on foot to have it placed in all the public schools of the city. One has been placed on the first floor of the City Hall, and measures are in process for setting it up in other public places. Accepting the testimony of the Health Authorities of Rochester, the "Drinking Fountain" is a pre-eminently clean thing in a strict sanitary sense. The adoption of such a fountain in the public schools and in other public places provided with water supply in this country is well deserving the attention of an enterprising manufacturer.

WATER SUPPLIES IN RURAL DISTRICTS.

By Dr. M. J. OLIVER, Medical Officer of Health, County of Roxburgh.

THE difficulty of finding water for farms and houses is in many parts of the country very great, and there can be no doubt that these difficulties will become greater unless the methods of dealing with supplies at present followed by proprietors and their agents are altered. From many conversations on the subject, I gather that it is a prevalent idea that if the supply of a farm be impure, and a spring welling up from the depths of the earth cannot be found within a short distance of the farm, it is impossible to obtain a pure supply, and the Local Sanitary Authority must allow the use of an impure water to be continued.

To a certain extent the difficulties in maintaining the purity of supplies, and in finding new ones, arise from neglect of the conditions which must be observed, having regard to the nature of the sources of water available in this district. Owing to the geological formation of the country, deep springs are very rare, but small collections of water occur freely among the superficial clay beds and in the deposits of gravel by the streams. The deeper rocks are generally waterless, consisting as they do in a very large part of the district of porphyry, fissured and pervious.

The available sources are, then, either surface or subsoil water, and in cultivated land the former cannot be used on account of pollution from farming operations. Whether the water is brought to a farm by gravitation, or is obtained from wells in the vicinity, the source of the water is the same—the subsoil—the source being in one case on high ground at a distance, and in the other in low ground, and near. The conditions to be observed, if pure water is to be obtained, are the same in both cases and the chief condition is that the fountain-heads or wells must be efficiently protected against the entry of surface water from cultivated land.

When we look at the customary method of doing this, we find that it is not calculated to effect the desired object. When a spring is found, the ground is usually excavated to a depth of from 4ft. or 5ft. to 8ft. or 10ft., the water is conducted in land tiles to a large tank constructed of bricks and cement, and from there in close-jointed iron pipes to the farm. As soon as the operation is completed the land over the sources is ploughed and manured in the ordinary routine of farming. In other instances, wells are sunk in arable land or close to farmsteadings and houses; the lining is of stone, with perhaps 2ft. or 3ft. of puddle clay at the top; and when a stone or wood cover has been fixed the soil is replaced, and the ground cultivated and manured as usual.

On action being taken by the Sanitary Authority, the proprietor says the farmer should not have manured the ground near the fountain-head or well; while the farmer complains that he is not supplied with pure water, and maintains that he must manure and cultivate the ground he is paying rent for. All this can obviously be prevented by arrangement at the time of letting the farms. A clause in the lease would prevent any disagreement as to the right of proprietors or farmers; but in arranging the lease each of the parties is often disinclined to raise the question of water supply, the farmer knowing that he can at any time secure the interference of the Sanitary Authority, and the proprietor trusting that, as the water has been used for many years, its purity will not be questioned now.

It is known that if polluting matter, such as manure, is only occasionally applied to ground, that the surface water is sufficiently purified by percolating through about 10ft. of soil; and that, therefore, if the spring or fountain-head, the pipes or land tiles leading to it, and the pipes from it to the cement tank were all at more than 10ft. from the surface, it would be possible for the occasional application of farm manure to the land not to render the water unwholesome. These conditions are, however, very rarely found; if the tank or the springs be sufficiently deep, runners or leaders to the spring are nearly always to be found comparatively near the surface. In fact, it is probable that not in five hundred of the water supplies in this country have every part of the collecting apparatus at 10ft. from the surface.

In the case of wells this condition may be more easily obtained, as the sides may be puddled with clay to a depth of 10ft., or the well may be cemented over at that depth; but there may be difficulty in preventing leakage along the sides of the suction pipe, and there is difficulty in obtaining access if the well has to be opened for any reason. This, moreover, only protects from occasional pollution of the surface of the ground, and is of little value when the source of pollution is a leaking house-drain or a soil polluted by frequent additions of organic matter, as is frequently the case in the neighbourhood of houses.

It is evident, therefore, that depth is in many instances sufficient to ensure the purity of water, but the condition is not always to be obtained, and any old field drains in the neighbourhood, the existence of which has been overlooked, may render all precautions as to depth of no value.

When, however, the surface of the ground is guarded by a layer of good old turf there is little cause for doubts as to the purity of the sources below. Dr. Robertson, in the course of some experiments, found that vegetation interfered with the growth of the typhoid bacillus in soil. It is known that the roots of plants are surrounded by enormous numbers of nitrifying microbes. The plant roots ramify through the upper layers of the soil, and carry the microbes with them. The work of Dibdin and others has shown that these are the most

powerful agents we possess for purifying sewage, and the life of disease-producing bacilli is short when the soil is already occupied by a vigorous growth of the harmless species. It is therefore the case that a matted bed of turf roots is one of the most perfect filters, and the fact of land being covered with it adds enormously to the safety of waters derived from the soil beneath. The explanation may be only the outcome of recent investigations, but the fact that subsoil water from grass land is safe has long been recognised. The frequent recurrence of the names "Well-acre," "Well-park," &c., shows that our forefathers considered such an enclosure a necessary adjunct to the well. It is probable that many of these parks were only ploughed in the early part of this century, when every patch of ground fit for growing wheat was cultivated.

Reversion to the old practice of sinking wells in grass land would, with rare exceptions, prevent their pollution. In cases where there is no pasture in a suitable situation, it would surely, in these days when farmers are all anxious to reduce the labour bill, be possible to arrange to lay down a paddock in grass for the special purpose of protecting the well. Where gravitation supplies are introduced, and the sources are in arable land, the same treatment is necessary. It is, of course, necessary that a certain amount of discrimination be exercised in fixing on a site for a new well. It should be above, rather than below, the level of the farm buildings, and on the side of a farm distant from a stream rather than on the near side.

Unless such old-fashioned methods of obtaining pure water be adopted there is nothing short of such a scheme as that recently under the consideration of the Kelso District Committee—the proposal being that about forty miles of water mains should be laid to supply water to the fifty-five places mentioned in the County Sanitary Inspector's report as without proper supplies. This would mean a rate of 6d. per £ on the whole district; and if all the proprietors charged with the cost of the scheme desired to have the water brought within a reasonable distance the cost would be prohibitive. The large number of comparatively new wells or gravitation schemes, by which it is sought to find good water in the polluted soil near houses, or within a few feet of the surface of arable fields, shows that proprietors, or those on whom they are accustomed to rely for advice, absolutely fail to realise the conditions necessary for obtaining pure water, and they must materially alter their methods if the desired object is to be obtained at reasonable cost.

CALCUTTA.—A telegram has been received from the Relief Society at Calcutta which states that, despite the panic in consequence of the plague, a great meeting has just been held protesting against the Municipal Bill, which, depriving the elected Commissioners of their powers, vests them in an official chairman, and a Committee of twelve, where the elected Commissioners will be in a hopeless minority. The chairman, Rajah Binaykishna, said that the city's twenty-two years of self-government were doomed. The Bill was strongly condemned by the speakers, who appealed for English help. Sir James Woodburn was thanked for his generous plague policy.

SYSTEMS OF SEWAGE PURIFICATION.

THE following is a synopsis of the report of the special committee of the Manchester City Council appointed to visit various towns, and report as to the best method of dealing with the Manchester sewage:—

The Manchester main drainage scheme, which was approved by the City Council on April 7th, 1887, has been in process of construction since that date. On December 31st, 1896, the City Surveyor reported that the sewage of an area of 5888 acres, representing a population of 400,360 persons, had been connected with the new system, and that a volume of sewage amounting to 16 million gallons per day average normal flow had to be treated at the works at Davyhulme. On December 31st, 1897, it was computed that the area connected was 7250 acres, with a population of 512,500 persons, and the amount of sewage being dealt with is 20 million gallons per day.

The means of purification adopted at the works have not been of such an efficient character as to enable an effluent to be produced which was considered by the Joint Committee as fit to be put into the water of the Ship Canal. In consequence, proceedings against the Corporation were instituted at the County Police-court. On September 16th, 1896, an order was made in terms agreed upon to the effect that the Manchester Corporation undertook to do all the acts necessary to prevent pollution within twelve months' time.

The proposal subsequently made by the Rivers Committee was to construct a culvert to convey the effluent to the river Mersey at Randle's Sluices. This scheme was altered to putting the effluent into the river at Woolston Weir, and was sanctioned by the City Council on the 18th November, 1896, but was rejected at a meeting of owners and ratepayers on the 4th March, 1897. The Rivers Committee on the 5th April, 1897, decided to proceed with the construction of two bacterial filters of one acre each. The Council meeting on 5th May referred this back to the committee for further consideration. The Rivers Committee eventually made a recommendation to the Council of a culvert scheme for conveying the effluent from the precipitation tanks to the tidal estuary. This was approved at the Council Meeting on September 1st, 1897. On September 9th, 1897, the stipendiary magistrate at the County Police-court granted a further postponement until November 30th, 1897.

On October 6th, 1897, the City Council, by a vote of 71 to 3, resolved to promote a Bill in Parliament to construct a culvert to convey the effluent to Randle's Sluices. A similar proposal was negatived at a meeting of owners and ratepayers on September 24th, 1897, and a poll was demanded, and taken on October 30th, 1897. The result was that 49,069 ratepayers opposed the resolution, and 20,528 approved, and there being a majority of 28,541 against the proposal, the scheme was abandoned. The Town Clerk applied to the stipendiary on November 26th, 1897, for an extension of time to comply with the order of the Court made on September 16th, 1896.

This application was granted, and the summons was adjourned until the 25th day of March next,

the stipendiary stating that he would then expect from the Corporation some scheme that would deal with the sewage in a way satisfactory to the Joint Committee.

On November 2nd, 1897, the Rivers Committee resigned, and on November 24th the present Rivers Committee was constituted in its place. At its second meeting, held December 6th, 1897, it appointed a special committee, termed the Effluent Sub-committee. Their duties were to consider and report upon the best method of dealing with the Manchester sewage in order to produce a satisfactory effluent.

REPORT OF EFFLUENT SUB-COMMITTEE.

The Sub-committee at its first meeting agreed upon the following bases of inquiry:—(*a*) That the means of solving the sewage question of Manchester lay on the lines of purification; (*b*) that the practicability, cost, and efficiency of artificial filtration should have their first consideration; (*c*) that every known system of treatment should be fairly considered, and that certain places should be visited for that purpose; (*d*) that all information which would lead to greater efficiency in the precipitation process be obtained.

Your sub-committee have had numerous meetings and they have visited many places. A descriptive account of these visits, compiled by the City Surveyor, is now sent to each member of the Rivers Committee.

The Effluent Sub-committee have given their best consideration to every system and suggestion that has been brought before them. Over sixty different schemes and appliances, and about fifteen suggestions, have been fully considered. In some cases opportunity was afforded to persons to explain their schemes before the Sub-committee.

Visits to the works at Davyhulme have been made in order to familiarise your Sub-committee with the possibilities of adaptation and improvement, and also with the true nature of the difficulties to be overcome.

The Committee report that the following towns have been visited:—

London: The Northern Sewage Works of the London County Council at Barking.

Friern Barnet (Middlesex): The Sewage Works of the Friern Barnet District Council.

Sutton (Surrey): The Sewage Farm and Precipitation Works of Sutton Urban District Council.

Hendon: The Sewage Works of the Hendon Urban District Council at Hendon, Middlesex.

Chorley: The Sewage Works of the Chorley Corporation.

Oldham: The Sewage Works of the Oldham Corporation at Slack Valley.

Swinton: The Sewage Works of the Swinton and Pendlebury Urban District Council at Folly-lane.

Salford: The Sewage Works of the Salford Corporation at Weaste.

Glasgow: The Sewage Works of the Glasgow Corporation for the drainage of the portion of the city of Glasgow.

Accrington: The Sewage Works of the Accrington and Church Outfall Sewerage Board at Coppy Clough.

It will be within the recollection of the Council that in the years 1878—1895 deputations from the Rivers Committee visited various sewage works.

The Davyhulme (Manchester) Precipitation Works were completed, and the treatment of sewage by chemical precipitation commenced in December, 1893.

The quantity of sewage thus dealt with has gradually increased as the old sewers of the city have been connected up with the new intercepting system of sewers, until at the present time the sewage from upwards of 512,000 persons is intercepted, and treated at the Davyhulme Works. Soon after the works were opened it was found that large quantities of grit from the street surfaces, sand, crushed clinker, &c. &c., were washed down to the works, and deposited at the inlet ends of the precipitation tanks. This was especially noticeable in times of flood, when as much as 300 tons of this material were brought down within the twenty-four hours. A small catchpit 44ft. long and 6ft. deep were originally formed at the outlet to the main sewer at Davyhulme, but as no means were provided for cleansing this pit it was discontinued on the advice of Mr. James Mansergh, M.I.C.E., Consulting Engineer, who was called in to advise the Rivers Committee in the interval between the decease of the late City Surveyor and the appointment of the present officer. The cost of removing heavy material deposited in the precipitation tanks was found to be considerable, as it had to be barrowed by hand on temporary plank gangways to the north side of the tanks, and then deposited on the land of the Corporation. Consequently, the Rivers Committee instructed the City Surveyor to prepare plans for screening chambers, intercepting catchpits, &c., somewhat similar to those in use at the sewage works of the Sheffield Corporation. The contracts for these catchpits, with buildings and machinery for adding and mixing the chemicals, are now let, and the works are in progress, and may be expected to be completed within six months from this date.

The system of precipitation at first adopted by the Rivers Committee consisted of treatment with lime and alum cake. This treatment was discontinued on the recommendation of Sir Henry Roscoe, and treatment with lime and protosulphate of iron substituted. This treatment has been continued up to the present time.

The effluent from the tanks is, with the exception of a very small quantity, passed direct into the canal. A small quantity is treated on 26¼ acres of land filters. The filtration of the effluent in four small experimental filters is still continued, and the results are carefully recorded.

Chemical report.—The purification of the Manchester sewage should consist in the production of an effluent of such a character as will fulfil the following conditions. It should be:—First, free from suspended matter; secondly, practically neutral (*i.e.*, containing excess neither of acid nor alkali); thirdly, not liable to noxious decomposition.

The known methods employed for sewage purification may be classed under the following heads:—(*a*) Land irrigation, with or without previous treatment; (*b*) chemical precipitation and subsidence; (*c*) bacterial treatment, with or without previous chemical treatment; (*d*) the system known as the "Septic" system. The systems that were inquired into or examined by your Sub-Committee all fall into the one or the other of the above classifications.

LONDON OUTFALL WORKS.

On December 22nd, 1897, the deputation visited the Northern Outfall Works of the London County Council at Barking. They were accompanied from London by Mr. J. E. Worth, M.I.C.E., the District Engineer, and were met at Barking by Sir Alexander Binnie, the Chief Engineer of the London County Council, and Dr. F. Clowes, F.I.C., the Chemist to the Council.

The sewage of the whole of the County of London north of the Thames, together with some outside districts, having a total estimated population of 3,266,348, is treated at these works. The total expenditure on these Barking Outfall Works to the present time amounts to £514,980.

The following description of the works was kindly given to the deputation by Mr. J. E. Worth :—

There are thirteen precipitation channels, ranging in length from 860ft. to 1210ft., 30ft. in width, of a working depth of about 8ft. 6in., and capable of holding 20,315,925 gallons. These extend over an area of eleven acres, and are covered by brick arches. There are two openings to each channel from the main outfall sewers, regulated by hydraulic penstocks 7ft. by 6ft. The effluent from the above channels passes through the old reservoir, and out of the nine openings in it into the river. Any one of the precipitating channels can be shut off for cleansing purposes. There are also twelve sludge settling channels, each 140ft. long and 20ft. wide, capable of holding sludge to a depth of 13ft. These channels are for the purpose of further concentrating the solids in the rather liquid sludge. There are stores under them for receiving and storing the finally settled sludge to the extent of 20,000 tons, exclusive of that stored in the sewage settling channels, and by this means provision is made against foggy weather, when the sludge vessels may be delayed in discharging their cargoes. There are culverts or communications with the various precipitation channels and the sludge settling channels, also for conveying the sludge to the pumps, liquor stores, &c. There is also an engine-house with two boiler-houses, one on each side, together with a repairing shop. The engine-house contains four 8in. centrifugal pumps, with 27in. fans, each driven by a vertical inverted single-cylinder engine, capable of discharging five tons per minute. There are also two 12in. centrifugal pumps, with 36in. fans of the same type as the others, but with more powerful engines. These are for lifting the diluted sludge as run from the precipitation channels into the sludge settling channels, a maximum lift of 21ft. Two Murray chain pumps are provided for lifting thick sludge from the lower store into the suction well of the pumps, next to be described. There are four horizontal compound pumping engines, with 13in. high-pressure cylinders and 22½in. low-pressure cylinders, of 18in. stroke. The pumps are 13in. double-acting ram pumps, each rod being coupled to the tail rod of the steam cylinders. Each pump can discharge four tons of sludge per minute into the iron main leading to the jetty for loading the steamers. There are three liquor pumps of a similar type to those above mentioned, but with a 12in. high-pressure cylinder, 21in. low-pressure cylinder, and 18in stroke, the pump rams being 14in. in diameter. These were for pumping the liquor drawn from the settled sludge through a 14in. main to the liming station, but a not unimportant improvement has taken place in this respect—that of dealing with the liquor drawn off from the settled sludge separately from the main body of sewage into which it was formerly discharged at the liming station above described. This liquor, amounting to 1¼ million gallons daily, or approximately 1 per cent. of the daily flow of sewage, is now treated with 20 grains of lime and 10 grains of protosulphate of iron per gallon, which quickly precipitates the suspended matter and deodorises this black and filthy liquid. Two hydraulic engines and accumulators supply power for lifting the twenty-six penstocks in the precipitation channels. Steam is furnished by ten boilers 22ft. long and 6ft. in diameter, working at a pressure of 75 lb. per square inch. There are sluices for opening and closing the communications between the various chambers, and pipes and appliances for ventilating and flushing the several chambers; and also a lever-house, which contains the means for lowering the telescopic weirs in the precipitating channels. There is also a river-water settling pond, 218ft. by 155ft., for supplying water to the liming and iron-water stations.

The liming station, for the preparation of lime water for treating the sewage, includes lime stores, slaking floor, wash mills, pipes and troughs for conveying sewage water from the sewer to mix with the slaked lime; also six large lime-water mixing tanks, an engine and boiler-house, coal-shed, and chimney shaft, and two large iron tanks or reservoirs for lime water above the lime store. There are two 17in. centrifugal pumps, with a capacity of 22 tons per minute; the maximum lift is 40ft. Each pump is driven by its own tandem engine, having inverted cylinders, the high-pressure being 12in. and the low-pressure 22½in. in diameter, the stroke 14in., and the fan 4ft. 6in. in diameter, making 250 revolutions per minute. Each is supplied with a surface condenser. The boilers are steel, three in number, 25ft. long, 6ft. in diameter, working at a pressure of 75 lb. per square inch. These buildings are situated about half a mile from the precipitation channels.

(*To be continued.*)

THE LOCATION OF HOUSE CISTERNS AND A PLEA FOR THEIR ABOLITION.

By ALFRED EDWIN HARRIS, M.O.H., St. Mary, Islington.

IN past years the Public Health Department of St. Mary, Islington, have found it necessary to compel owners to remove the cisterns from improper positions, such as from beneath the floors of bedrooms as well as from the rooms themselves; from within water-closets, and in not a few cases from above these places; from wash-houses, where, of course, the water was liable to contamination from the fluff and dirt of the clothing; and occasionally from the staircase landings of tenement dwellings, where the supply from the tap was situated at the bottom of the house. In the last cases it was found that tenants habitually drew the water direct from the cisterns in pails or vessels whose cleanliness could not always be guaranteed. It is a matter of regret that statutory power does not exist to compel property owners, who let their houses in this manner, to supply one draw tap to each floor, so that tenants, if cleanly, may not be put to the great labour and inconvenience of con-

veying water upstairs, and if lazy and uncleanly, they may be deprived of their only excuse for such habits.

That the action of the Public Health Committee is right has been very clearly proved just recently by the discovery in a new house in Tollington Ward that the water cistern was placed by the builder in the servant's bedroom.

I would very much like to see all cisterns intended for the storage of water for domestic use altogether abolished when the constant supply has been laid on to all parts of the parish, for they will not then be really required, if the company do its duty with regard to mains that are not buried sufficiently deep, and therefore liable to be frozen. I have lived during my lifetime in four great towns which possessed a constant supply, and in none were these cisterns tolerated. In each it was compulsory on the water companies to give notice to householders, when, owing to repairs, it became necessary to cut off the water temporarily, so that they might make some arrangements to store a sufficient supply for a short period, generally for a few hours, rarely for a day, and I have never known any serious inconvenience to occur.

The time is now approaching when the public and their representatives should insist that London must be provided with a proper, efficient, and sufficient supply to meet its demands, and then the only excuse for the continued existence of these cisterns will have ceased. They are sometimes the cause of disease through their want of cleanliness, and are often death-traps for rats, mice, and insects. Indeed, it is not long since a case of enteric fever was reported to me by a provincial Medical Officer of Health, who wrote to inquire as to the state of affairs existing in the house in Islington from which the patient had just arrived in his town, and who, without doubt, contracted the disease in this parish. An examination of the water cistern discovered a putrid mouse.

A pure water supply is now looked upon as so necessary for the preservation of health that I am surprised at the toleration of a system which so readily lends itself to the pollution of that element which is the greatest necessity of life. In 1896 the New River Company supplied its customers for domestic purposes with a daily average of 28,474,737 gallons, representing 177 gallons per house and 24·48 gallons per head of the population, and it is melancholy to think that the great bulk of this water was more or less contaminated in storage cisterns before it was consumed.

A 3300 MILLION-GALLON RESERVOIR.

ABOUT 200 gentlemen interested in the London water supply visited Staines on Saturday to see the cutting of the first sod in the construction of a great new reservoir for which the New River, the West Middlesex, and the Grand Junction Companies are to be responsible. For this purpose they have formed a Joint Committee, with Mr. E. Boulnois, M.P., as chairman, and Sir J. Savory, M.P., as deputy chairman. In 1896 Parliament empowered the Committee to raise £1,000,000 in debenture stock, and to take from the Thames 100,000,000 gallons of water in every twenty-four hours, pumping it into the reservoir at Staines, whence it would be distributed to the three companies for conveyance to the metropolis.

According to the Act of last year but one, the Staines reservoir should only contain 2500 million gallons, but the Committee want it to hold 3300 millions, and are so confident that Parliament will this session sanction the extension that they have adopted plans for a lake of the larger size. Should they be justified the reservoir—it will practically be one, though it is spoken of as two—will be about a mile and a quarter long, with a width varying from five-eighths of a mile to more than seven-eighths. Such a fine sheet of water would add to the beauties of Staines, but it will only be visible from a balloon, for it will be enclosed by banks 21ft. to 35ft. high, guarded by inclinable iron fences. The water is to be taken from the Thames above Bell Weir, about a mile and a-half higher up than Staines. There will, of course, be pumping stations and about five miles of acqueduct, partly open and partly covered, the lower end being at Hampton. Mr. Walter Hunter and Mr. Reginald E. Middleton are the engineers, Messrs. John Aird and Sons the general contractors.

Very complete arrangements were made for the visitors on Saturday. They were carried from London to Staines in a special train of first-class coaches, from Staines to the nearest part of the ground in wagonettes, thence to the point where the ceremony was to take place in the contractors' railway train, whereof the trucks had been specially fitted with new seats. They were hospitably provided with an excellent lunch, and were sent back to London by the diverse conveyances in which they had come. It was Mr. Boulnois who cut the first sod, after Mr. Aird, M.P., had presented him with a gorgeous spade of ebony and silver. Amid laughter and cheers, Mr. Boulnois did his work with much energy, placing in the glittering ceremonial barrow not only the first sod, but many spadefuls of earth besides, and wheeling it all up and down a plank as if he were earning sixpence an hour. Among the gentlemen present were Sir T. G. Fardell, M.P., Mr. E. A. Goulding, M.P., Mr. H. Kimber, M.P., Sir William Marriott, Sir C. Gibbons, and Sir J. Whittaker Ellis.

MEETING OF MUNICIPAL ENGINEERS AT WIMBLEDON.

A DISTRICT meeting of the Incorporated Association of Municipal and County Engineers was held at Wimbledon on Saturday last, the 30th April. There was a large attendance of members, who were welcomed by the Chairman of the Wimbledon Urban District Council. Mr. Joseph Lobley, Vice-president, occupied the chair. After the re-election of Mr. G. B. Laffan, of Twickenham, as hon. district secretary, a paper on "Municipal Work at Wimbledon" was read by Mr. C. H. Cooper, engineer and surveyor to the Council. The population of Wimbledon is 38,000 as compared with 4654 in 1861. The streets are lit by oil lamps at a cost of £2 11s. 9d. per lamp per annum, as against a cost of £5 10s. which was demanded by the Gas Company, and which the late Local Board refused to accede to. Very shortly these lamps are to be supplied with electric light, a scheme being in course of progress under the superintendence of Mr. A. H. Preece, electrical engineer. The rate-

able value of the district is £230,000, and the general district rate is 3s. 2d. in the £ per annum.

The system of sewerage is the duplicate one, surface water and sewage sewers being provided, surface water from the backs of houses, however, being admitted into the sewage sewers. Sewage disposal is effected by broad irrigation and intermittent downward filtration on beds composed of burnt ballast, having a depth of about 3ft., the ballast, however, being covered with a layer of soil about 7in. in depth. One portion of the sewage is strained through a mechanical strainer formed of brick bats, and then passed over the farm. The major portion of the sewage flow is, however, first precipitated in settling tanks, chemicals to the extent of 4 grains of proto-sulphate of iron and 12 grains of lime per gallon being added to aid precipitation. The resulting sludge is manufactured into sludge cake at a cost of 2s. 0¼d. per ton of cake. About 100 tons being produced weekly, which has, however, no marketable value, and it is proposed to erect destructors in connection with the electric light station to consume both cake and house refuse. The area of the sewage farm under cultivation is 59¼ acres, the soil of which was originally stiff clay, but which has now, with the addition of domestic ashes (applied for a considerable number of years on the surface and ploughed into it) been converted into a fair soil.

The Council are at the present time constructing depôt accommodation for the stud of thirty-nine horses kept by them, and for cartsheds, workshops, store-rooms, &c., which are designed and being constructed most effectively, while plans have also been prepared for an isolation hospital for one hundred beds.

A paper on "The Wimbledon Electric Lighting Scheme," by Mr. A. H. Preece, Electrical Engineer to the Council, was also read, after which there was a short discussion, followed by inspection of the works, and later in the afternoon an inspection of the Conduit and Insulation Company's works, Summerstown, was made, where a paper on "Electric Wiring Practice" was read by Mr. S. H. Bathurst, M.I.E.E.

The system of back drainage, as adopted for terrace houses, was inspected, and also the method of testing drains, wherein it appears that the Council permit the construction of combined drains to receive the sewage of not more than six houses. Each house drain, however, is required to be disconnected from the common drain by a disconnecting trap fixed in a chamber 2ft. 3in. long by 2ft. wide, and at or near the head of the common drain a ventilating shaft is carried up above the roof of the adjacent dwelling at the cost of the owner. No drains are allowed to pass under dwelling-houses. The method of testing new drains is the hydraulic or water test, which is twice applied to every drain, viz., before the drains are covered up, and subsequently when the ground is filled in, this being adopted to ensure that the joints are not disturbed in filling in the trenches. In addition to this, the smoke test is applied after all the fittings have been connected to the drains and soil pipes.

At the conclusion of the proceedings, which were highly interesting throughout, votes of thanks were accorded to the Wimbledon Council for placing the offices at the disposal of the Association, to the readers of the papers, &c.

Sanitary Inspectors' Associations.

SOUTH WALES AND MONMOUTHSHIRE.

A MEETING of members of the above Association was held at the Council Chamber, Guildhall, Swansea (by kind permission of the Mayor), this being the second meeting of the session. There was a large attendance. The chair was taken by the President, Dr. W. Williams, M.A., M.D., D.P.H., Medical Officer of Health to the county of Glamorgan. The Mayor of Swansea (Mr. J. Aeron Thomas), Dr. Ebenezer Davies, Medical Officer of Health, Swansea; Dr. Tafford Mitchell, Medical Officer of Health, Gowerton; Dr. A. Lloyd Jones, Mumbles; Thomas Phillips, J.P., Swansea; Dr. Herbert Jones (treasurer); and Mr. J. Tony Thomas (secretary) being among those present.

On the motion of the PRESIDENT, Dr. Ebenezer Davies was elected an honorary member. In making the proposition the President said Dr. Davies had been Medical Officer at Swansea since 1865, and he was too well known throughout Wales to require any eulogistic mention that afternoon. Dr. Thomas, Nantymoel, was also elected an honorary member.

The following gentlemen were elected members: Messrs. D. M. Jenkins (Neath), W. P. Jones (Glyncorrwg), Rhys Davies (Brecon), Joseph Humphreys (Maesteg), M. Williams (Bridgend), and Stanley Brunn (Oystermouth).

The Mayor of Swansea was accorded a very hearty welcome when he entered the room. In response to an invitation from the PRESIDENT to speak,

His WORSHIP said, in support of the Superannuation Bill, if Sanitary Inspectors only discharged their important duties faithfully and fearlessly public opinion would see that they were not only well paid, but enabled to put sufficient aside to enable them to create a superannuation fund.

The SECRETARY read a lengthy report in reference to the effort made in the promotion of the Sanitary Inspectors' Superannuation Bill for 1898. Many Welsh Members of Parliament had been seen. Communications were proceeding with Sir W. Harcourt with a view to a deputation waiting upon the right hon. gentleman; indeed, he had himself written the Secretary that he would receive a deputation.

The PRESIDENT delivered a most interesting address, which was received with continued applause.

Excellent papers were read by Mr. LLEWELLYN DAVIES, Chief Sanitary Inspector, Swansea, on "House Drainage"; and by Mr. DAVID JENKINS, Chief Port Sanitary Inspector, Cardiff, on "Port Sanitary Work." Most instructive discussions followed the reading of both papers.

The usual votes of thanks concluded a most enthusiastic meeting.

The members had tea together at the Mackworth Hotel at the close.

GLOUCESTER.—The Town Council has decided to apply to the Local Government Board for power to borrow £15,000 for the proposed new infectious diseases hospitals.

ADULTERATION AT DUDLEY.

THE annual report of Mr. J. Brown, the Borough Inspector under the Food and Drugs Acts, contains some very interesting matter, as well as valuable information. He warns us, amongst other things, to avoid salicylic acid, and to see that we get soda water when we order it. Salicylic acid, it appears, is the main ingredient of many preservatives, and is simply death to digestion. Soda water, as a rule, is taken with a "drop o' summat" in it, but according to Mr. Brown, the British Pharmacopœia prescription for soda water makes it quite unsuitable for a beverage. Only a third of the amount of bi-carbonate of soda is necessary in a 10 oz. bottle for ordinary drinking purposes, and Mr. Brown rather significantly points out that mineral waters which are simply carbonated or aërated should be labelled and sold as such, and not as soda or potash water. Evidently it is possible for the harmless soda-water drinker to be deceived. The percentage of adulterated articles last year, however, is very satisfactory. The figure is 7·6 per cent. (including the doubtful samples), while the average for England and Wales is 9·2 per cent. That well-known infantile physic, paregoric, is apparently a very difficult article for the chemists. It must not be without opium, and it must not have too much. Of six samples of paregoric one was found to contain no opium, and the defendant was fined £1 and costs. The other five cases contained the full 40 grains of opium—a scheduled poison—and the sellers were called upon by the Pharmaceutical Society to pay £5 5s. each. Perhaps the most satisfactory thing about the report is that it shows that real attention is now being paid to the important matter of pure food and drinks.

HAMPSTEAD PUBLIC BATHS.

AN official inspection by the chairman and members of the Baths and Wash-house Committee of the Hampstead Vestry has just been made to the new administrative block of the public baths in Finchley-road. The old front portion of the baths, which included administrative block, seven slipper baths, and the superintendent's apartments, was pulled down in consequence of the carrying out of the Manchester, Sheffield, and Lincolnshire Railway works. The company paid the Vestry £8300 as compensation, and gave them a larger area of ground for re-building upon, the new area being 5056 square feet in place of 2000 square feet. The new front is built in the English Renaissance style of an early type, from the designs of Messrs. Spalding and Cross, of Cheapside, at a cost of £8995. The builder was Mr. T. Kingerlee, of Oxford. The new buildings include an entrance-hall, with central ticket-office leading to two entrances for men and women respectively, twenty-four slipper baths (in place of seven old ones), with enamelled slate divisions, superintendent's and clerks' offices, board-room, and waiting-room, and superintendent's apartments. The baths now include four swimming baths and a number of slipper baths. The old portion of the baths has been repaired and re-decorated throughout.

General News.

SOUTH GOVAN.—The building of a dust destructor is being advocated.

SHREWSBURY.—The Local Government Board has refused to sanction the loan for a new water supply.

LITTLEHAMPTON.—The Urban District Council has adopted a water supply scheme which will cost £10,717.

SHIPLEY.—The increased death-rate in Shipley last year is mainly attributed to the ravages of influenza.

WARMINSTER.—The Urban District Council has invited tenders for proposed swimming bath at Smallbrook Mill.

PATRICROFT.—At a public meeting called by the Eccles Ratepayers' Association a further extension of the hospital was agreed upon.

WALTHAMSTOW. — The Urban Council has resolved to apply for sanction to borrow £2238 to build a Coroner's court and mortuary.

WOLVERHAMPTON. — The Water Committee have recommended that a new service be laid at a cost of £150, the parties concerned to pay half this amount.

NEWMARKET.—The Urban District Council has approved conditionally plans for a new 12in. water main from the water company's reservoir to the pumping station.

BRIGHTON.—Another pumping station is to be provided for the waterworks, and tenders will be invited for the building and equipment of the same, and for the sinking of various shafts, &c.

CHESTER-LE-STREET.—The Guardians propose to borrow £250 in addition to the £850 already sanctioned by the Local Government Board for erection of isolation wards at the workhouse.

SCUNTHORPE.—The Local Government Board has sanctioned the borrowing of £5000 by the Urban District Council to commence boring operations for a water supply. The total cost is estimated at £16,000.

CHISWICK.—At the first meeting of the newly-elected Urban District Council it was stated that the contract had now been signed for the purchase of a site for an isolation hospital. The price for the three acres was £2000.

EPSOM. — The Urban District Council has received from the British Institute of Preventive Medicine the result of their analysis of a sample of the water supply, which showed that it was of excellent quality, and well adapted for drinking purposes.

LONDON.—A Select Committee of the House of Commons on Thursday, the 28th ult., began the consideration of the Southwark and Vauxhall Water Bill, the objects of which are to enable the company to acquire lands, construct additional works, and take additional water from the Thames. The company propose to construct new storage for 1,076,000,000 gallons of water.

PORTLAND.—The Urban District Council has decided to borrow a further sum of £7647 for the carrying out of a water supply for the island. This will bring the total loan up to £37,000.

NORWICH.—The new refuse destructor at New Mills erected by the Horsfall Furnace Syndicate, Limited, of Leeds, is now in full operation. The destructor supplies steam for sewage-pumping purposes.

BILLERICAY.—The Urban District Council has virtually come to terms with the Southend Waterworks Company, and has, therefore, decided not to pursue its opposition to the company's Bill in Parliament.

LEEDS.—The Corporation Sub-Sanitary (Hospitals) Committee has accepted the tender of Mr. John Robinson, of Kirkgate, for the painting of pavilions and other buildings recently erected in connection with the fever hospitals at Manston. The amount of the contract is £500.

WITHINGTON (LANCS).—The Clerk to the Urban District Council has received from the Local Government Board an intimation that the Authority sanctions the application of the District Council for power to borrow £5500 wherewith to purchase the Baguley Lodge estate as the site for an infectious diseases hospital.

ST. HELENS.—The large additions recently made to the St. Helens Borough Sanatorium, or fever hospital, at Peasley Cross were opened last week by the Mayor (Alderman Richard Pilkington). The Sanatorium was first opened on the 25th of April, 1882. It then consisted of an old house of seven rooms, and the average number of patients was from eight to sixteen per annum. The total cost of the extensions has been £6389, and the total sum spent on the Sanatorium since the purchase of the residence of Mr. Radcliffe has been £14,120. The new buildings, which have been erected by Messrs. Whittaker and Woods, of St. Helens, comprise a large pavilion, an observation block of two wards, and a large increase in the administrative block which has been the means of remedying the previously unsatisfactory accommodation for the nurses. The Sanatorium has now accommodation for seventy patients.

BRIGHTON.—The report of the Medical Officer of Health (Dr. A. Newsholme) for the year 1897 draws attention to the fact that the death-rate was lower in 1897 than in any preceding year, that there was an entire absence of small-pox, and adds: "The official administration of vaccination in Brighton is happily accompanied by much less friction than in most towns, and the percentage of successful vaccinations is much above the average." As to the deaths from alcoholism, Dr. Newsholme characterises alcohol as one of the chief causes of premature old age. The evil effects are very commonly produced by systematic indulgence that would by most be regarded as "moderate." Those who, while never becoming intoxicated, daily take a considerable amount of spirits (especially if taken apart from meals) are much more likely to suffer in health and prematurely break down than the labourer who may get drunk once a fortnight and be a teetotaler in the interval.

Personal.

DR. F. R. BLAXALL has been appointed bacteriologist to the Local Government Board.

MR. H. A. ENDSOR has been appointed surveyor for the rural district of St. Haiths (Norwich).

MR. R. WEDGE has resigned his position as Sanitary Inspector for the rural district of Cannock.

MR. W. C. WILLIAMS has been appointed a Public Analyst for the county borough of Bootle.

DR. J. BLACKLOCK has been appointed Medical Officer for the Brindle district of Chorley union.

MR. W. GARDNER has been appointed Medical Officer for the Nunney district of Frome union.

MR. G. ANDERSON has been appointed Medical Officer for the Swinefleet district of Goole union.

MR. H. M. MACGILL has been appointed Medical Officer for the Hartlepool district of the union.

MR. J. C. O'RAFFERTY has been appointed Medical Officer for the first district of Daventy union.

HUGH JONES, M.B., D.P.H., has been appointed Medical Officer of Health for the rural district of Dolgelly.

MR. N. DEEKS, jun., has been appointed Inspector of Nuisances for the rural district of Castle Bromwich.

MR. J. S. MELLISH has been appointed Medical Officer of Health for the Wells Port Sanitary Authority.

DR. BRADSHAW has been reappointed Borough Medical Officer for High Wycombe for a term of three years.

R. PARKHURST, M.B., has been reappointed Medical Officer of Health for the urban district of Long Sutton.

MR. J. S. MELLISH has been appointed Medical Officer of Health for the urban district of Wells-next-the-Sea.

MR. A. S. ROBINSON has been appointed Medical Officer for the Kirkleatham district of Gainsborough union.

MR. J. A. BUDGE, Leven, has been appointed Burgh Surveyor for Buckie in succession to Mr. Chisholm, transferred to Peterhead.

MR. C. DEVEREUX, M.B., B.C., L.R.C.P., has been appointed Medical Officer for the Tewkesbury sanitary district of the Tewkesbury union.

MR. KENNETH CAMERON, Sanitary Inspector of Aberdeen, has been the recipient recently of two marks of honour which testify to his standing in the sanitary profession. One is his nomination as president for the ensuing year of the Sanitary Inspectors' Association of Scotland, which holds its annual meeting in Perth toward the end of June. The other is an invitation to become vice-president of the Conference of Sanitary Inspectors at the annual congress of the Royal Institute of Public Health, which is to meet in Dublin this year. Mr. Cameron has accepted both offices.

THE appointment to the vacancy in the honorary hospital medical staff of the Ladies' Charity and Lying-in Hospital, Liverpool, has been conferred upon Mr. Alexander Stookes, M.B., C.M., L.R.C.S. (Edin.).

Sewerage Schemes.

[TO MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

THE Hungerford Rural District Council has not yet been able to procure a site for its drainage works.

THE Corporation of Derby has gained further respite from the County Council in respect to the drainage scheme.

THE tender of Mr. W. Walkerdine, Derby (£1341 18s. 5d.) has been accepted for carrying out the Chasetown (Staffs.) drainage scheme, prepared by Mr. E. W. Ives, C.E.

A LOCAL Government Board inquiry has been held at Wakefield into an applicaton of the City Council for leave to borrow £14,776 for purposes of street improvement, and £1224 for works of sewerage.

AT the last meeting of the Town Council, Kingston-on-Thames, it was decided to request Messrs. Dibdin and Thudicum to examine and report on the best means of improving the effluent from the sewage works.

A LOCAL Government Board inquiry was held at Dinas Powis on the 27th ult. into an application made by the Llandaff and Dinas Powis Rural District Council for power to borrow £4500 for works of sewerage at Dinas Powis, in the parish of St. Andrew's Major.

A SPECIAL meeting of the Leyton Urban District Council was held recently to discuss a lengthy report of the surveyor on the drainage of the district. The report showed the necessity for the practical reconstruction of the whole drainage system of the district at a total cost of about £50,000. The discussion took place in Committee.

THE Ipswich Town Council has decided, on the recommendation of its Sewerage Committee, to replace the existing heavy wood and iron sluices at the outfall by Stoney's patent sluices, so that the sewage and storm water can be much more rapidly discharged than at present. The estimated cost, including brickwork and masonry, is £350, and provision for this has been made in the estimate of the expenditure of the Sewerage Committee for the current year.

AT a recent meeting of the Chipping Sodbury District Council, a report was presented by the Inspector of Nuisances as to the condition of the Horsfield ditch, and it was resolved that an engineer be employed to examine and report upon the cost of preparing a scheme of drainage.

THE Rivers Committee of the Manchester City Council met on the 28th ult. to decide what sum should be borrowed for treating the city sewage at Davyhulme on the bacterial system. It was agreed to ask the sanction of the Local Government Board to the borrowing of £160,000. This sum, it is estimated, will be required for thirty-seven acres of bacteria beds, and the purchase of the necessary land for aëration purposes.

A LOCAL Government Board inquiry has been held at Dalton recently, into the application of the Urban District Council for sanction to borrow the sum of £11,500 for carrying out a scheme for dealing with the sewage of the district. The scheme was explained by the engineer, Mr. Radford, of Nottingham, and it is proposed to acquire a large portion of land belonging to Mr. W. B. Beaumont, near to Swallow Hill, Mapplewell, for the outfall works. The estimate is exclusive of the cost of the site.

THE seventh annual report of Mr. Bartie, Sanitary Inspector of Selkirkshire, dealing with the year 1897, has just been issued. The report states that more attention is being given to proper drainage of houses, but there is an unwillingness to carry out improvements, especially in old cottage property, the tendency being rather to allow it to go to ruin than to keep it fit for habitation. Drainage improvements have been carried out at Howden, Laidlawstiel, Ettrickhouse, Clovenfords, South Common Cottage, Yarrowfeus, Beechwood, and Bannerfield.

A SPECIAL sitting of the Poole magistrates was held recently at the Guildhall for the purpose of hearing objections to the sewerage of Heckford Park, Longfleet, under the Private Streets Works Act. Mr. John Elford, borough surveyor, produced the plans, estimates, and apportionments for sewering the district, and bore out the statements of the town clerk as to the desirability of carrying the sewage of the houses along the Garland-road through a sewer in the Garland-lane. If the sewage was not taken in that manner it would become necessary to lay iron pipes under the houses and connect with the sewer in Garland-road, which was an objectionable thing to do and would not receive the sanction of the Council. The case for the objectors, as stated by Mr. Trevanion, was that Garland-road was a public road, and therefore the Corporation should not seek to make the property-owners whose property abutted on the high road carry their sewerage into the back-road, and thence have to pay their contribution towards the works under the Private Streets Works Act as well as for the public sewer. The magistrates upheld the apportionments of the Town Council, and the objections were all disallowed.

A LOCAL Government Board inquiry was held at Thrapston recently by Mr. Sandford Fawcett, A.M.I.C.E., in respect of an application made by the Council to borrow money to carry out a drainage and sewage disposal scheme prepared by Messrs. Sharman and Archer, Wellingborough. The system of sewage disposal is that of the "Universal" Company, Derby.

THE city engineer for Bristol recently reported to the Sanitary Committee on a proposal he made for providing for the drainage of houses at Upper Knowle, the overflow from the cesspools of which now at times came across the road. He proposed a sewer, which would be of permanent utility, discharging into a tank to be constructed in a field upon terms agreed with the owner. The tank would cost about £50, and would serve as a temporary measure. The Committee approved of the proposal.

CHICAGO is determined to put a stop to the pollution of her drinking water. Without waiting for the completion of her great drainage canal she proposes to stop the discharge of her sewers into Lake Michigan, which supplies her with drinking water. Two new sewers are to be constructed, emptying into the Illinois and Michigan Canal, and slight changes will be made in some of the existing sewers to adapt them to this plan. A rather curious feature of the work in hand, according to the *Scientific American*, is an alteration in the grade of a section, 104ft. long, of an old sewer, so that its contents will flow westward instead of eastward. The inclination is very slight, and the required modification will, therefore, be trifling. A flooring of concrete will be laid on the bottom of the great 6ft. conduit. It will be nearly 18in. thick at what is now the lowest end, and less than 6in. thick at the other.

Lighting.

ARRANGEMENTS are being made for the installation of the electric light in the Golden Temple at Amritsar.

THE Vestry of St. Pancras has made a profit on the electric light during the past year of £5000, and now proposes to reduce the price to consumers.

THE Bangor City Council has resolved to carry out improvements on the gas plant at an estimated cost of £22,900, and to erect electric lighting works at a cost not exceeding £10,000.

THE Bakewell Gas Bill, which has already passed through the House of Lords, came before the Examiners of the House of Commons recently, for proof of compliance with the further Standing Orders. There was no opposition at this stage, and the necessary formal proofs having been given, the Bill was ordered to be reported for second reading.

THE Edinburgh and Leith Corporation Gas Bill has passed the Committee on Unopposed Bills in the House of Commons, the preamble being proved by Bailie Kinloch Anderson.

THE Sheffield City Council, at a special meeting held recently, unanimously confirmed the propriety of promoting a Bill in Parliament to acquire the undertaking of the Electric Light Company.

A LOCAL Government Board inquiry has been held at Croydon recently into the application of the County Council to borrow various sums, amounting in all to over £11,000, for electric light extensions, &c.

AT a recent meeting of the Ripon City Council a draft Provisional Order from the Local Government Board for gasworks extension was approved, the Board stating that the time for the repayment of the existing debt could not be extended beyond five years.

THERE are signs that the Keighley Corporation is about to approach the question of electric light supply in earnest. A visit was paid last week to Southport, and steps are to be taken to obtain a Provisional Order to enable the Gas Committee to supply the newer illuminant.

IT has been proposed that, in addition to the £95,000 to which the Glasgow Corporation already stands committed, a further expenditure of £61,000 be authorised for Port Dundas station and mains; and that an expenditure of £108,000 be authorised for the South-side station and mains.

HIGH WYCOMBE is now within measurable distance of the completion of its much-debated and long-anticipated electric lighting scheme. The necessary works have been commenced, and the ceremony of the foundation-stone laying, which took place recently, marks a stage in the advancement of the scheme, from which the progress to completion, it is understood, will be so rapid—excepting any eventualities which are at present unforeseen—that on the 1st of July the town will be able to switch on the new illuminant.

THE result of the working of the electric light in Shoreditch for the nine months to the end of March is awaited with much interest, and already rumours are getting about that the financial statement will show a profit of over £2000. Let us hope this will prove to be correct, for a great deal must depend upon the result of the experiment in Shoreditch. Extensions have already been decided upon, and the Authorities concerned are showing great energy and enthusiasm in carrying out the scheme. The eyes of the country—and beyond—are turned towards Shoreditch in regard to the working of the combined scheme, and the example will doubtless be followed in many other places.

THE Waterford City Gas Company Bill, which has passed the House of Lords recently, came before the Committee of the House of Commons on Unopposed Bills. The Bill has been promoted to secure further powers to the City of Waterford Gas Company in connection with their undertaking, including authority to raise additional capital, and to consolidate the existing capital into stock bearing a uniform standard rate of dividend of 5 per cent. The preamble having been proved, the clauses, with a few slight verbal amendments, were passed, and the Bill was ordered to be reported for third reading.

AT a recent meeting of the Edinburgh and Leith Gas Commission it was reported that the consumption of gas in Portobello had increased enormously since the amalgamation with Edinburgh, and to meet it the Commissioners agreed to have a new main laid from the Edinburgh works to Portobello, at an estimated cost of £7000. When it is laid the Portobello works will only be used during times of pressure. The new main would be laid so as to be part of the distributive plant from the new works at Granton. It was resolved to raise the price of gas for the lighting of common stairs in Edinburgh from 15s. 9d. to 18s. 11d. per lamp per year. The additional charge to the Corporation of Edinburgh would be £1224 a year.

FURTHER important developments are contemplated in St. Pancras. At a recent meeting of the Vestry, a report of the Special Dusting and Destructor Committee stated that since the cells at the refuse destructor had been reconstructed the superintendent had reported that there was a great amount of heat for which he had no use. The Committee had been in communication with the Electricity and Public Lighting Committee with regard to the utilisation of this waste heat for heating the boilers for driving the machinery of the adjoining electricity station. The chief electrical engineer had investigated the matter, and was satisfied that the destructor works could supply the electricity station with heat for the machinery. As to the actual amount of heat which could be supplied from the destructor to the station, the engineer had promised to make a test in regard thereto, and to report the result.

PERHAPS the town of Fort William may be said to be the first real instance where the electric light has entirely taken the place of gas to such an extent that the manufacture of the latter has ceased. Fort William had what was understood to be the oldest gasworks in Scotland, and shortly after the opening of the West Highland Railway it was purchased from the owners by Mr. H. Mayberry, Glasgow, who applied for, and obtained, parliamentary powers to become the Lighting Authority of the town and district, and to erect a new gasworks within a limited period. A site had been procured, but in the interval an electric light company was formed, which from water-power close by has succeeded in introducing a first-class light. The railway stations are now lit up with the electric light, and the West Highland Railway Company has now agreed to take over the gasworks' properties, which bound its line of rails in the immediate vicinity of the station.

Obituary.

MR. HORACE CHALDECOTT, OF DORKING.

THE death of Mr. Horace Chaldecott, a well-known local surgeon, took place at his residence early on the morning of the 22nd ult., in his fifty-third year. The deceased gentleman had been suffering for some months past from a painful internal complaint, which left no hope of his recovery. He commenced practice in Dorking in partnership with his brother, Mr. Chas. W. Chaldecott, in the year 1868, but subsequently a mutual dissolution was come to, and each carried on separate practices. Mr. Chaldecott was, until he resigned a few weeks ago, one of the Medical and Vaccination Officers to the Dorking Union, and was also one of the surgeons to the Dorking branches of the Foresters and Oddfellows. In 1871 he married Mrs. Danby. He was the youngest son of the late Mr. William Chaldecott, of Dorking, and uncle to Mr. Howard J. Chaldecott, the Chairman of the Dorking Urban District Council.

DR. PATERSON, OF BRIDGE OF ALLAN

THE death took place on Friday, 22nd ult., at Bridge of Allan, of Dr. Alexander Paterson, the well-known horticulturist and antiquary, after an illness extending over several months. The deceased gentleman was a native of Dundee, and was born in 1822. In his sixteenth year he entered the medical classes in Edinburgh University, and obtained his degree of M.D. in 1843. He began the practice of his profession in Edinburgh, but his health giving way he was recommended to visit Bridge of Allan. He derived so much benefit from the change that he settled down in the village as medical practitioner, and during his long life he never lost an opportunity of bringing the merits of the Bridge as a health resort before the world by correspondence to the Press and otherwise.

He held the office of Medical Officer for the burgh, and was a Justice of the Peace for the county of Stirling. Not only in the district in which he resided, but all over the country, Dr. Paterson's death will be deeply regretted. He leaves a widow and grown-up family.

Correspondence.

We do not in any way hold ourselves responsible for opinions expressed by our correspondents.

OUR PRISON SYSTEM.

(*To the Editor of* THE SANITARY RECORD.)

SIR,—In yours of the 22nd you state that "it was ascertained that of 180 prisoners discharged from convict prisons last year no less than 97 had gained in weight on an average of 7 lb." Permit me to remark, first, that this only applies to convict prisons, and not to the ordinary prisons, in which the great majority of prisoners are confined. Convict prisons are, in fact, those set apart for prisoners undergoing a sentence of penal servitude,

in which, owing to its duration, scientific starvation could not be carried to the extent which would be possible in ordinary prisons where the duration of sentences is much shorter; secondly, that in fact the Home Secretary was not referring to convict prisons generally, but to Dartmoor in particular; thirdly, I strongly suspect that the number, which the reporters set down as 180, was really 380, for I find that in the last published return—that for 1896—the prisoners released from Dartmoor during the year, in the ordinary course, exceeded 370. I should be very much surprised if this number fell to 180 (or less than half) in the course of a single year. Men are usually sent to penal servitude at an age when an increase of weight might naturally be expected, and if only 97 out of 380 exhibited such an increase, it would, I think, tend to bear out the charge of scientific starvation rather than to refute it.

Over 1200 persons were liberated from our convict prisons in 1896. You will see the absurdity of supposing that only 180 were liberated in 1897—unless all releases were stopped in honour of the Jubilee. In any case, it was not a year for the liberation of the captives.—Yours faithfully,

INQUIRER.

Dublin, April 29th.

Notes and Queries.

Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C.

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

1061.—THE BREAD ACT, 1836: PROVISIONS OF.—"A. B." writes:—"This Urban Council have passed the following resolution:—'That the Sanitary Inspector be empowered to take all the necessary steps to enforce the provisions of the Bread Act, 1836, within this district.' Will you kindly advise me as to the following:—(1) Can bread be legally sold other than in quartern or half-quartern loaves? (2) If bread can be sold in varying weights, can the seller be proceeded against so long as he only charges in proportion to the weight sold? (3) In the purchasing of a loaf or loaves of bread, is it necessary, in view of legal proceedings, to make any statement to the seller at the time of purchase, as is the case when purchasing samples of food for analysis? (4) Can I purchase by deputy? (5) What course ought I to take in instituting proceedings, when the seller has sold bread otherwise than by weight, and the loaf is lighter than the quartern or half-quartern, and yet charged for as full weight?"

Answer.—It is necessary to observe that the resolution directing the "Sanitary Inspector" to take the necessary proceedings is not in order, as there is no such officer under the Public Health Acts—excepting the Public Health (London) Act, 1891, and the Public Health (Scotland) Act, 1897—as a Sanitary Inspector. The title to be used in legal proceedings should be "Inspector of Nuisances," and not Sanitary Inspector, otherwise proceedings may fail. (1) Yes. See Secs. 3 and 4 Bread Act, 1836. (2) No. (3) It does not appear to be necessary. (4) Yes. (5) Lay a complaint before a Justice of the Peace within forty-eight hours after the offence is committed. See Secs. 18, 20, and 31 of the Act. Our correspondent should obtain a copy of the Bread Act, 1836, price 10d. post free, from the Sanitary Publishing Company.

1062.—BOYLE'S EXHAUST VENTILATORS: COST OF.—"J. C." writes:—"Would you be kind enough to inform me what the cost of Boyle's exhaust ventilator would be, and how placed on roof? It is only for a small hall, and I have not seen a ventilator of this kind put in."

Answer.—Boyle's latest improved patent air-pump ventilator, which can be recommended for the purposes required, is made in different sizes from 12in. diameter, with 4in. to 6in. pipe, price £1 12s.; up to 54in. diameter, with 18in. to 27in. pipe, prices £19 15s. to £41 10s. We should recommend our correspondent to communicate with the patentees, Messrs. Robert Boyle and Son, Ltd., 64, Holborn-viaduct, London, furnishing them with particulars as to area and cubic capacity of room, when they will advise him as to the proper size of exhaust ventilator to be used, and price, and also give instructions as to the method of fixing.

1063.—PURIFICATION OF WATER: BOOK ON: RECOMMENDED.—"F. G. H." writes:—"Can you please tell me of a good book on the purification of public water supplies? I have Dibdin's 'Purification of Sewage and Water,' and require an additional work on the subject."

Answer.—Our correspondent will find Rideal's "Water and its Purification," price 6s., an excellent book for his purpose. Another good book is "The Filtration of Public Water Supplies," by Allen Hazen, late chemist in charge of the Lawrence Experiment Station of the Massachusetts State Board of Health. Price 8s. 6d. This book may be obtained from the Sanitary Publishing Company, 5, Fetter-lane, London, E.C., post free on receipt of the published price.

1064.—SANITARY INSTITUTE EXAMINATIONS: AGE LIMITS, &c.—"J. B." writes:—"Will you kindly inform me what are the age limits and subjects of examination for Sanitary Inspectors, also the best books and their prices for the study of the required subjects?"

Answer.—Candidates for the Sanitary Institute Examinations must be more than twenty-one years of age. The subjects of examination may be obtained from Mr. G. White Wallis, secretary of the Institute, Parkes Museum, Margaret-street, London, W. We recommended in our reply to Query 1034, in our issue of April 15th, a list of books to be studied, to which our correspondent should refer.

1065.—INSTITUTE OF SANITARY ENGINEERS: ADDRESS OF.—"T. H. S." writes:—"Will you kindly favour me with the name and address of the secretary to the Institute of Sanitary Engineers?"

Answer.—The offices of the Institute of Sanitary Engineers are at 63 and 64, Chancery-lane, London, W.C., the secretary being Mr. Edward C. Toller, to whom communications respecting the Institute should be addressed.

1066.—SMOKE-TESTING MACHINES FOR DRAINS.—"Inquirer" writes:—"I am asked by the Council of which I have the honour to be Medical Officer of Health to acquire the best smoke-testing machine for drains. I know of several, but would like your opinion as to which are the best kinds. I always, I may say, look forward to the reading of THE SANITARY RECORD with very much pleasure."

Answer.—Probably the best smoke machine obtainable for testing drains is the "Eclipse" patent drain tester, manufactured by Messrs. Burn Brothers, 23 and 24, Charing-cross, London, S.W. Expanding plugs of 4in., 6in., and 9in. diameter should be procured with it.

Another good machine is the "Asphyxiator," manufactured by Messrs. John Watts and Company, Broad Weir Works, Bristol. We are pleased to have our correspondent's appreciation of THE SANITARY RECORD.

1067.—RAILWAY COMPANIES' PREMISES: APPLICATION OF ACTS AND BYE-LAWS THERETO.—"M. D." writes:—"In the urban district of A., a railway company have numerous workshops. (1) Has the Inspector of Nuisances power to inspect the workshops (upon the company's premises) as to the sanitary arrangements? (2) If H.M. Inspector of Factories should visit the above-mentioned workshops, and report to the Sanitary Authority as to the unsanitary conditions, can the Inspector of Nuisances then inspect the premises? (3) Should there be insufficient closet accommodation for the workmen, upon whom must the notice be served? (4) Does Sec. 20, Sub-section 4, of the Public Health Acts Amendment Act, 1890, apply to workshops owned by a railway company?"

Answer.—Our correspondent evidently labours under a misapprehension as to the powers of Sanitary Authorities in relation to buildings belonging to railway companies. Sanitary Authorities have the same jurisdiction as regards nuisances, insufficient water-closet accommodation, drainage, water supply, and the general sanitary condition of buildings owned by railway companies, as they have over any other premises within their district. The only exemption which is provided for in regard to such buildings is that whereby the bye-laws in regard to new streets and buildings are not applicable to buildings belonging to a railway company, and used for the purpose of such railway under an Act of Parliament, as prescribed by the last clause of Sec. 157 of the Public Health Act, 1875. But this exemption, it should be observed, does not extend to cottages for workpeople, but is confined to buildings which are part of stations or warehouses adjoining stations, and so directly connected with the traffic of railways. (1) The Inspector of Nuisances has the same powers of inspection of workshops belonging to a railway company as he has in regard to any other workshop. (2) Certainly. (3) Notice should be served upon the secretary of the railway company. (4) No.

1068.—BYE-LAWS AND REGULATIONS DEFINED.—"H. G. G." writes:—"Would you kindly inform me what is the difference between a bye-law and a regulation under the Public Health Act, 1875? This question was asked at a recent examination of the Sanitary Institute for Inspectors of Nuisances."

Answer.—By-law or bye-law (from the Scandinavian *by*, a town, as Whitby, and *law*) means a local or private law. In public health, a law made by a Local Authority in pursuance of the special powers given by the statutes. Thus, bye-laws may be made under Secs. 44, 80, 90, 113, 141, 157, &c., of the Public Health Act, 1875. Bye-laws when made by a Local Authority under the Public Health Acts do not take effect (and are thus distinguished from regulations) until they have been submitted to and confirmed by the Local Government Board, as provided by Sec. 184 of the Act of 1875. Regulations are rules or orders prescribed by a Local Authority as to the action of those under their control. For instance, regulations may be made with respect to the duties and conduct of servants employed by them, under Sec. 189 of the Act; or they may be described as a governing direction, as, for instance, under Sec. 21 of the same Act,

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whereby regulations may be made in respect of the mode in which drains may be connected with sewers. See also Secs. 125, 143, &c. Regulations differ from bye-laws, as enacted by Sec. 189, in that, as previously described, they are not required to be submitted to the Local Government Board for confirmation or approval.

1069.—SURVEYING AND LEVELLING: PRACTICAL INSTRUCTION IN.—"W. H. R." writes:—"Will you kindly inform me where I can obtain practical instruction in surveying and levelling?"

Answer.—Classes for instruction in practical surveying are, we believe, conducted at King's College, London. Mr. Richard Parry, F.S.I., &c., 27, Great George-street, Westminster, we notice, also advertises in respect to classes on this subject which are conducted by him.

1070.—NUISANCE FROM OVERFLOWING CESSPOOL: WHO IS RESPONSIBLE FOR?—"Nemo" writes:—"I am the owner of a parcel of land, and at a point therein a drain receiving the drainage of several piggeries, which exist on the land of another owner, terminates in a soak-away. This is now deemed to be a nuisance, and the Urban District Council call upon me to abate it, which, although not caused by me, is on my land. (1) Can the Urban Authority compel me to abate the nuisance, or does the responsibility rest with the adjoining owner? (2) Should I be justified in stopping up the drain at the point C, or in pulling up the pipes which are laid on my land? (3) If I am liable for the abatement of the nuisance, what action would you advise me to take, having in view the fact that I am desirous of building on my part of the land?"

Answer.—(1) This will depend on whether the drain from the piggeries is a sewer, and vested in the Urban Council. It seems to us that it is not a sewer, and that the nuisance must be abated by the owner on whose land it occurs. See Meader *v.* West Cowes Local Board (61 L. J., ch. 561; L. R., 3, ch. 18). (2) No. (3) If the adjacent owners have acquired an easement in respect to the drain in land belonging to our correspondent, he should remedy the nuisance by the construction of a cesspool or additional drain. If, however, it could be shown that the drain is a sewer vested in the Urban Authority, the owner might call upon the Urban Authority to provide proper means of drainage.

Contracts Open.

dates given below are the latest up to which tenders can be received.

BARROW-ON-SOAR (LEICS).—May 9th—Sewers—Mr. Herbert Herrod, surveyor, Barrow-on-Soar.

EMBLETON (NEAR ALNWICK).—May 9th.—Cleaning Sewage Ditch.—Mr. H. W. Walton, clerk, Alnwick.

BELFAST.—May 10th.—Sewers.—The City Surveyor's Office.

LLANERCHYMEDD (ANGLESEY).—May 10th.—Drainage System.—Mr. Jos. Owen, Menai Bridge, architect.

STOCKTON-ON-TEES.—May 10th.—Sewer.—Mr. John Rodham, Finkle-street, Stockton-on-Tees.

BEDLINGTON (NORTHAMPTON).—May 11rh.—Sewerage Works.—Mr. Cuthbert Brown's Office, Bedlington.

WOKINGHAM.—May 11th.—Re-sewering Roads, &c.—The Surveyor, Town Hall, Wokingham.

DUBLIN.—May 12th.—Cisterns, &c.—Mr. Owen Armstrong, secretary, Irish Lights Office, Dublin.

DARTFORD.—May 12th.—Sewer.—Mr. W. Harston, A.M.I.C.E., High-street, Dartford.

Vacancies.

ASSISTANT BOROUGH SURVEYOR (LUTON, May 14th).—For the Town Council. Salary £110 per annum. Mr. Geo. Sewell, town clerk, Luton.

ASSISTANT SURVEYOR (MANCHESTER, May 7th).—For the Corporation. The salary will be £130 per annum. Mr. Wm. Henry Talbot, town clerk, Town Hall, Manchester.

CLERK OF WORKS (PLUMSTEAD, May 11th).—For the Plumstead Vestry. Wages £3 3s. a week. Surveyor, Vestry Hall, Maxey-road, Plumstead.

CLERK OF WORKS (WOLVERHAMPTON, May 7th).—Salary £3 3s. per week. Mr. J. W. Bradley, borough surveyor, Town Hall, Wolverhampton.

CLERK OF WOKRS (HANDSWORTH, May 9th).—For the School Board. Salary £3 per week. Thomas H. Moon, clerk.

ENGINEER (LONDON, W.C., May 25th).—For the Metropolitan Asylums Board. Salary £600 per nnnum, with travelling expenses, office accommodation, and the necessary clerical assistance. Application forms may be obtained from Mr. T. Duncombe Mann, clerk, Chief Offices, Norfolk House, Norfolk-street, Strand, W.C.

ENGINEER'S ASSISTANT (NORWICH, May 9th).—Salary £100 per annum. Mr. Arthur E. Collins, A.M.I.C.E., city engineer, Guildhall, Norwich.

INSPECTOR OF WEIGHTS AND MEASURES (ST. AUSTELL, May 12th).—For the General Purposes, Parliamentary and Allotments Committee of the Cornwall County Council. Salary £120 a year. Mr. Wm. Coode, clerk, St. Austell.

INSPECTOR OF NUISANCES (BROMLEY, May 14th).—For the Rural District Council. Salary £150 per annum, inclusive of all expenses. Application forms can be obtained at the Clerk's Office, 96, High-street, Bromley.

JUNIOR ASSISTANTENGINEERS (UGANDA, May 21st).—For the Uganda Railway. Salary £300, rising to £400 per annum. Secretary, Uganda Railway Committee, Foreign Office, Downing-street, S.W.

SURVEYOR, &C. (WIVENHOE, NEAR COLCHESTER, May 11th).—For the Urban District Council. Salary as surveyor £10 per annum, and inspector of nuisances £30 per annum. Mr. C. W. Denton, clerk, Colchester.

SURVEYOR, &C. (LONDON, S.E., May 9th).—For the Vestry of Camberwell. Salary £500 per annum, rising by annual increments of £50 to a maximum of £700. Application forms to be obtained from Mr. C. William Tagg, vestry clerk, Vestry Hall, Camberwell.

SVRVEYOR, &C. (LLANDRINDOD, WELLS).—For the Urban District Council. Salary: Surveyor £20, inspector £20, and collector £25 per annum.—Mr. D. C. Davies, clerk to the Council, Llandrindod Wells, Radnorshire.

COMPETITIONS.

FORMBY (LANCS), July 1st.—Sewerage Scheme.—The Formby Parochial Committee invite competitive schemes for the sewerage of a portion of the township of Formby. Premiums are offered amounting to £100 for the scheme considered first in order of merit, £50 for the second, and £25 for the third. Mr. J. H. Havelock Sutton, Piercefield-road, Formby. A professional assessor will be appointed to adjudicate upon the plans.

To Medical Officers, Surveyors, Sanitary Inspectors, &c.—High-grade Cycles at reasonable prices for prompt cash and on the GRADUAL PAYMENT SYSTEM. Catalogue post free.—MELROSE CYCLE COMPANY, Coventry.

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Salary 30s. per week.

Applications in applicants' own handwriting, stating age, qualifications, and previous experience, and enclosing copies of not more than three testimonials, and marked outside "Assistant Sanitary Inspector," to be sent in to me not later than Twelve o'clock (noon) on Tuesday, the 17th inst.

JOHN E. T. GRAHAM,
Town Clerk's Office, Scarborough, Town Clerk.
May 2nd, 1898.

BATH URBAN SANITARY AUTHORITY.

The above Authority are about to APPOINT a duly qualified ASSISTANT SANITARY INSPECTOR.

Candidates must state age, qualifications, previous experience, and salary required.

The duties will be to assist the Medical Officer of Health and Inspector of Nuisances in the performance of their duties under the Sanitary Acts, and the officer will be required to devote his whole time to the duties of his office.

Applications, in his own handwriting, endorsed "Application for Assistant Inspectorship," accompanied by not more than three testimonials of recent date, to be delivered to the undersigned on or before Saturday, the 14th day of May, 1898.

Dated, 5th May, 1898.

By order,
F. H. MOGER,
3, Wood-street, Bath. Clerk.

SANITARY INSPECTOR.

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Clerk to the Vestry.
Lambeth Vestry Hall, Kennington-green, S.E.,
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THE

Sanitary Record,

MAY 13, 1898.

Notes.

Adulterating Dairy Products.

SELDOM has a more influential deputation appeared before the head of a governmental department than that which waited upon Mr. Chaplin last week, with the object of urging her Majesty's ministers to fulfil the promise of last year and introduce a Bill dealing with food adulteration. Over seventy of the leading agricultural and kindred societies of the kingdom were represented, and each country had a spokesman. The primary object of the deputation was to point out that if British dairy produce was to be protected, as well as the public being secured against fraud, any measure should include four special points:—"The establishment of a Court of Reference for fixing standards of purity; the examination of dairy products at the ports, with the view of checking the importation of adulterated produce; the prohibition of the artificial colouring of the margarine to resemble or imitate butter; and the prohibition of the sale of mixtures of margarine and butter." Further, it was contended as to the growing importation of foreign milk, that in the interests of the public health that product ought not to be allowed to be sold in this country when it was produced under unsanitary conditions. The introduction of preservatives or antiseptics was condemned.

No Hope for Legislation this Year.

THE speakers did their utmost to make out a case, and prove the urgency for action on the part of the Government; but very little encouragement was given in the reply made by Mr. Chaplin. And it is always so with Governments. Measures are placed in the front of the sessional programme about which the community have little or any concern, whole evenings may be wasted in the excited discussion in the affairs of other nations and peoples, but pressing reforms at home are relegated to a "back seat," only to be quietly snuffed out when the "slaughter of the innocents" commences. Granted that some of the points raised may be of a debateable character, it is well known that most flagrant adulterations are practised by some, and fresh powers are needed to put an end to such practices. And the law should be made equally applicable to foreigners as to the home producer; for here is the hardship justly complained of by members of the deputation—their dairies, &c., are subject to the most minute and critical inspection, and properly so, yet there is no guarantee that the produce from other countries does not come from places where unsanitary conditions prevail, or that the animals on the farms are not suffering from disease.

The Cost of Cremation.

IN recent years there has been considerable change in public opinion, or rather sentiment, with regard to the disposal of the dead. Gradually the crowded state of cemeteries and the possible danger to the neighbourhoods surrounding them, is compelling the belief that a more rational method of burial might be adopted. The "earth to earth" coffins are being largely adopted; but many contend that these do not fully satisfy sanitary requirements, and that eventually cremation will have to be universally adopted. There appears to be considerable difference of opinion as to the cost of this method, but from a statement issued by the Cremation Society of England, it would appear that it does not greatly exceed the cost of an ordinary interment. We are informed that the actual charge for cremating a body at Woking is £5, but there are many other expenses, such as getting to and from the crematorium, which is 2¼ miles from Woking station, and it is estimated that the "cost of cremating a body of a person dying in London need not exceed 15 guineas, including all charges." The cost of the land and building at Woking was £5872, and one year's expenses amounted to £699 15s. for 173 cremations, but the actual net cost of the cremation itself worked out at a little less than £2 a body, the rest being swallowed up in

other necessary expenses. The large initial outlay prevents Local Authorities from adding crematoriums to their cemeteries.

"Not a Happy Lot."

Some will remember the celebrated Gilbertian chorus which tells that a "Policeman's lot is not a happy one," and their thoughts will inevitably go back to those lines as they read in our "Law Reports" the adventures of a Lady Sanitary Inspector at Liverpool. Miss Burton, an officer of the Corporation, in the course of her visits, called at the house of a dock labourer. The wife of this individual appears to associate all public officials with the School Board officer, and seeing Miss Burton in uniform, had a vague idea that she was after the "young 'uns," and immediately gave utterance to some very uncomplimentary remarks. But the Inspector was not to be denied, therefore she was taken into another room, where the said dock labourer "reclined upon the sofa." From this position he jumped up, seized Miss Burton "by the arm, and his wife blocking the doorway, the unfortunate Inspector was detained in durance vile for a good half-hour, the defendant insisting on examining her book, to see what names she had down. She was liberated ultimately, upon the intercession of one of the children. The defendant pleaded in extenuation, that he had just had some words with his wife, and it was suggested that he was consequently in a condition of irritation against womankind in general." For his "condition of irritation" he was deservedly fined 20s. and costs. Moral for Lady Inspectors: Before visiting any house, find out if the "husband has had words with the wife," or else it may go hard with you.

Sewers for Trade Refuse.

A judgment of more than ordinary importance to Local Authorities throughout the country has just been given by the House of Lords. The owners of a paper mill applied for a mandamus to compel the Local Authority to provide sewage accommodation, into which they could run the liquid from their works. This claim was made under the Public Health Act. The District Council denied that the plaintiffs could proceed under the Act, and maintained that if they had any remedy at all, it must be by appealing to the Local Government Board, who, if it thought a good case had been made out, could compel the Local Authority to carry out the work they had neglected. A mandamus was granted by the Court of First Instance, but this decision was reversed on appeal. The Lord Chancellor, with whom other members of the House concurred, took the view of the Court of Appeal, Lord Halsbury remarking that it would be unreasonable to permit a man to go into a small district and require the Local Authority to reconstruct its sewerage system for his benefit.

The Sewage Commission.

Mr. Chaplin has now announced the names of the members of the Royal Commission on Sewage Disposal. They are—the Earl of Iddesleigh (chairman), Sir Richard Thorne Thorne, Professor Michael Foster, Professor William Ramsay, Major-General Carey, Dr. J. B. Russell, Colonel Harding, Mr. T. W. Killick, and Mr. C. P. Cotton. The terms of the reference are, "to inquire and report what method of treating and disposing of sewage, including any liquid from any factory or manufacturing process, may properly be adopted for the protection of public health, and for the economical and efficient discharge of the duties of Local Authorities; and if more than one method might be so adopted, by what rules, in relation to the nature or volume of sewage, or population to be served, or other varying circumstances or requirements, should the particular method of treatment and disposal to be adopted be determined; and, secondly, to make any recommendations that may be deemed desirable with reference to the treatment and disposal of sewage."

The Scope of the Inquiry.

It will be seen from the scope of the remit that the field of inquiry will probably be a very wide one, and looking to the composition of the Commission, too, we may have every confidence that the inquiry will be searching and exhaustive. The relative merits of the various competing systems that at present divide the field will be carefully weighed and compared, and the efficiency of each system, and its suitability to the circumstances of any particular locality, will as far as possible be determined. It is too much to expect, perhaps, that the inquiry will result in the exclusive recommendation of the biological or bacterial filter system, which has grown so much in favour with scientists in recent years, or, indeed, of any other system; but, at all events, a flood of light will be thrown on the circumstances and conditions to which each method is applicable. Reliable information will also be obtained as to the relative costs of the different methods, which will be of immense service to perplexed Local Authorities, who are at present under the necessity of instituting elaborate inquiries themselves before embarking on the task of sewage purification.

Another case of Nominal Fines.

In a recent issue we drew attention to a case of the lax enforcement of the Food and Drugs Acts in Sunderland, and a few days later we observed that the Home Secretary was questioned in the House of Commons about a case that occurred in Southampton, where an offence against the Factory Acts was treated by the magisterial bench in a similar carelessly light-hearted spirit. A conviction was obtained against a firm of drapers for having kept three of their girls at work for 22½ hours continuously, and from midnight to seven in the morning, without even an interval for a meal; and what made matters worse was that the same firm had been convicted of a similar offence last year. It would be hard to conceive a more flagrant case, and the excuse offered, that it was to execute an urgent order, and that the girls were asked if they would work without an interval—as if in such a case it were a free option—was the thinnest possible palliative. And yet the fine imposed was only 1s. with costs. The Home Secretary marked his sense of the magistrates' treatment of the case by writing a strong expression of his opinion that they were not justified in treating such a violation of the

Acts as a merely technical offence. When cases of this kind occur, we are reminded of the necessity of a strong central department, to see that the intentions of the Legislature are not defeated by the vagaries of easy-going magistrates.

Local Authorities and Parliament.

The inclination to brush aside the behests of Imperial Law is one that especially besets the lesser judicatories, and it probably reaches its most acute phase in regard to the Vaccination Acts. When a man has been raised to the dizzy eminence of the magisterial bench, and feels that he owes his elevation to the divine institution of popular suffrage, he is apt to forget that there is a power higher than that of local ratepayers, and that is the power of Parliament, which rests upon the will of the nation. This attitude was well brought out in the debate on the Vaccination Bill. When Mr. Steadman, the Labour member for Stepney, avowed that the Board of Guardians to which he belonged had absolutely refused to carry out the present Acts, Mr. Chaplin quietly mentioned that under the Bill the institution of prosecutions would devolve in future upon the Vaccination Officers, and not, as hitherto, upon Boards of Guardians. Such an apparent slight of the popular bodies aroused the wrath of the Labour Party, who thereupon forwarded to the President of the Local Government Board a resolution condemning the proposal to enable an official to override the wishes of the electors and the Public Authority. Mr. Chaplin's reply was pithy and unanswerable. "Your contention," he wrote back, "appears to be that local bodies should be able to override the decisions and authority of Parliament. But in my judgment it is the authority of Parliament, and not that of the Local Authority, which should be supreme on a matter affecting the general interest."

The Plague in India.

The centre of interest with regard to the plague in India has now been transferred from Bombay to Calcutta. The experience that Bombay has passed through has been so terrible that it is small wonder that the first report of the outbreak of the plague in the Indian capital should have caused a certain degree of panic among the population. The natives fled at once from the city in large numbers—one estimate puts the number at 250,000—not so much, it is said, for fear of the plague as on account of the dreaded quarantine and segregation rules. But the panic subsided, and the exodus abated, on the Lieutenant-Governor causing it to be made known that the plague rules to be enforced would not be so stringent as those in Bombay; and on his giving an assurance that there would be no wholesale imposition of quarantine, though all suspected or real cases would be strictly segregated, under certain conditions. In fact, as appears from a statement made by the Secretary for India in the House of Commons, the policy of the Government in future is to unite an unflinching enforcement of all really necessary sanitary precautions and regulations with the utmost consideration for the religious susceptibilities of the people. They have had sufficient troubles from this source in Bombay to desire a repetition of them in Calcutta.

Inducements to Inoculation.

The Government policy is revealed in the Lieutenant-Governor's proclamation as to quarantine, and also in the inducements he is offering to the people to adopt Professor Haffkine's system of inoculation against the plague. In order to make the system popular, he has declared that, even should the plague break out in any family, every member of which has been inoculated, the person attacked will not be removed to hospital. Coupled with this declaration is the assurance that in no case will a husband and wife be separated, and every respect will be paid to the purdah system. The popular excitement being thus allayed, one prime source of anxiety for the Authorities is removed; the people are more tractable, and the latest news is that business is resuming its normal conditions. It is reassuring, too, to hear that the very natural fears that were at first entertained have not, so far, been realised. Comparatively few cases have yet occurred, and during the two or three days preceding the despatch of the latest information no cases were recorded. The opinion is now expressed that the outbreak is not epidemic, and we sincerely trust this may prove to be so; though, we fear, it is too early to place much confidence in this optimistic belief.

The Prisons Bill.

The Bill introduced by the Government for the reform of prison administration in England has been referred to the Grand Committee on Law of the House of Commons, which commenced its deliberations on Friday last. The two chief points of interest arising out of the first day's proceedings were, first, a proposal by Mr. Michael Davitt that the Prison Commissioners should include in their number a medical man skilled in mental diseases, a proposal which was adopted by the Committee by 25 to 8 votes, although opposed by the Government—why, we are at a loss to know; and, secondly, the question of corporal punishment, which led to a protracted discussion that had not been concluded when the Committee rose. The amendment under consideration was one providing that the prison rules should not give any power to order corporal punishment; and it was pointed out in support of this position that in Scotland and Ireland there is no provision for the ordering of corporal punishment in local prisons, and that in the Scotch and Irish convict establishments very little corporal punishment is ordered. The Home Secretary, in reply, admitted the desirability of doing away with this form of punishment as far as possible, and his anxiety to reduce it to a minimum; but he did not think it safe to abolish altogether the power to order it in cases of mutiny or gross personal violence. Probably it is wisest to retain the power, subject to certain clearly-defined restrictions and limitations.

TO OUR READERS.

The Editor solicits the co-operation of readers in making THE SANITARY RECORD *more attractive by means of pen-and-ink sketches, photographs, and diagrams. There are many phases of sanitary work which lend themselves admirably to illustration. By this means not only individual articles, but the journal as a whole will be brightened.*

LIME, MORTAR, AND CEMENT: THEIR COMPOSITION AND ANALYSES.

By W. J. DIBDIN, F.I.C., F.C.S., &c.

CHAPTER II. (*continued*).

SUBSTITUTES FOR SAND.

Puzzolano is a volcanic substance of a pulverulent character, of a violet colour, which was first employed in fabrication of mortars by the Romans. It was then, according to Vitruvius, found in the vicinity of Puzzoli, near Baia, and not far from Vesuvius. Subsequently, a similar material has been found in Vivarais, the theatre of extinct volcanic action in the centre of France; near Edinburgh; at a village called Brohl, near Andernach on the Rhine, where it is worked under the name of "trass" or "terrass;" and in almost all localities marked either by the present or past action of subterranean fires. Its aspect, however, varies much; sometimes it is in a state of powder, at others in coarse grains, often in the form of pumice, scoria, or of tuffa, or small rubble stones. Its colour is often brown, or yellow, or grey, or black, even in the same locality.

Tripoli, and the sandstones and limestones, altered by contact with the rocks of eruption, also frequently take the character of puzzolanos, and may be classed, therefore, as pseudo-volcanic products of a similar category. But the conditions under which they were exposed to the heat of the volcanic rocks, and under which they gradually cooled, have necessarily modified their chemical and mechanical nature.

The puzzolanos are principally composed of silica and alumina, with a little lime in combination, mixed with potash, soda, magnesia, and oxide of iron. The following analysis by Bertheir of the puzzolano of Civita Vecchia, and of the trass of Andernach, will be of interest:—

	Puzzolano.	Trass.
Silica	44·5	57·0
Alumina	15·0	12·0
Lime	8·8	2·6
Magnesia	4·7	1·0
Oxide of iron	12·0	5·0
Potash	1·4	7·0
Soda	4·0	1·0
Water	9·2	9·6
	99·6	95·2

A mixture of puzzolano and trass with the blue lias lime, was used by Smeaton in the Eddystone Lighthouse.

Burnt clay is sometimes used as a substitute for sand in mortar, but care should be taken that the clay is thoroughly well burnt, otherwise it will act as so much earthy matter and seriously reduce the hardening qualities of the resulting mortar. Crushed bricks are frequently used, but these simply come under the category of burnt clay.

Scoriæ from ironworks, clinker from brick kilns, and cinders from coal, make good substitutes for sand when they are quite clean and properly used. Unfortunately, in view of the fact that cinders may make a fair mortar under proper conditions, dust-bin refuse is often employed by unscrupulous builders, the whole of the foul refuse therein being included, with the result that there is no binding power, and but too often it creates a nuisance by the decomposition of the contained organic matter.

The main point which will come up for consideration in the subsequent chapter is the relation of weight to volume of these different substances. According to the bye-laws in force in London, the proportion of lime to sand or grit is to be determined by volume, and it will be seen that in view of the many different substances which may with propriety under proper conditions be employed, this question of relative weight and volume is of the first commercial importance.

The following table of the weight of various sands and other substances per cubic foot will therefore be of assistance to the reader. It must not be taken, however, that this table is to be relied upon in those cases where samples of the materials under consideration are obtainable, as in all such cases it should be weighed under normal working conditions. For comparison I have also given, in the table following this, another in which the weight of various limes is stated, but in this case also it will be best, wherever possible, to make direct determinations in each case. The weighings under the head of "Sand, &c.," have been specially made for the purpose of this chapter by Mr. C. Chambers Smith, C.E., to whom I have to tender my thanks for the reliable information thus kindly placed by him at the disposal of my readers.

Weight of One Cubic Foot of Sand, &c.

	lb.		lb.
Pit sand	100	Burnt clay	71
River sand	118	Cinders, clean	60
Broken brick	53		

Weight of One Cubic Foot of Fresh Lime.

In small lumps.	lb.	Ground.	lb.
White chalk	39	White chalk	38
Grey chalk, Halling	44	Grey chalk	43
Portland stone	47	Arden	68
Blue lias	58 to 70	Blue lias	49 to 68

Cements.

	lb.		lb.
Portland	74 to 101	Parian	60
Roman	60 to 62½	Plaster of Paris	50
Medina	61	Whiting	64
Keene's	64		

(*To be continued.*)

NOTES ON PRACTICAL SANITARY SCIENCE.

By WILLIAM H. MAXWELL.

Assistant Engineer and Surveyor, Leyton Urban District Council Author of "Drainage Work and Sanitary Fittings," "Ventilation Heating, and Lighting," &c., Certificates of the Association of Municipal and County Engineers, and Sanitary Institute.

(*Continued from page* 477.)

GENERAL OBSERVATIONS ON REFUSE DESTRUCTORS.

Cost of Construction.—In regard to the initial cost of the erection of Refuse Destructors very little reliable data can be given, as the circumstances of no two cases are, as a rule, even approximately similar. The outlay will necessarily be dependent, amongst other things, upon the difficulty or otherwise of the preparation of the site, upon the nature of the foundations required,

the height of the chimney shaft, the length of the inclined or approach roadway, and also upon the varying prices of labour and materials in different localities.

Information derived from "returns" of the costs of erection at various towns is of but little practical value, and, for all purposes, must be accepted with the greatest caution, as it is impossible to make useful comparisons between the costs of erection at various places without knowing the circumstances of each. Incidental works, such as boundary fences, special foundations due to bad ground, extra tall chimney shaft, mortar mills, engines, &c., may be included in the one case and not in another.

These differences will be apparent from an inspection of the following table, which gives the approximate initial outlays for the destructors at the places mentioned :—

Town.	No. of cells.	Height of shaft in feet.	Initial outlay, exclusive of site.	Cost p. ton of burning refuse, exclusive of interest on cost of works.
			£	s. d.
Battersea	12	180	12,000	2 10
Bootle	12	170	9,200	0 10½
Bournemouth... ...	6	140	3,171	0 9
Bradford	12	180	10,250	0 6
Brighton	12	225	16,679	1 7
Burton-on-Trent ...	8	144	4,266	1 7¼
Buxton	4	150	1,315	0 8
Cheltenham	8	160	6,000	0 7½
Govan	8	120	6,346	1 6½
Hastings	4	130	4,000	1 6¾
Hull	6	180	3,200	0 11
Leicester	6	160	6,694	0 8
Leicester	6	180	8,069	0 8
Leicester	6	180	8,852	0 8
Leyton	8	150	6,000	1 3*
London (City)... ...	10	150	13,311	1 8½
Liverpool (Charters-street)	24	170	11,488	0 9
Oldham	10	120	4,527	0 9¾
Rotherham	6	130	4,000	1 2½
Sheffield	6	180	9,500	—
Sowerby Bridge ...	2	140	1,829	1 2
Stafford	4	135	2,315	0 9
Whitechapel	16	180	10,500	1 1
Withington	6	150	6,600	0 8

* Pressed sewage sludge is mixed with refuse and burnt.

From the above figures it will be seen that the average cost of construction, including the usual accessories, but exclusive of site, at the towns named is about £840 per cell, and the average height of shaft is 158ft.

At Bristol the total cost of a 16-cell destructor was £11,418, of which £2909 was expended in foundations, and £1689 for the chimney shaft, thus leaving £6820 for cost of destructor, buildings, and approach road, or about £426 per cell.

The following averages of returns from thirty-five towns obtained by Mr. Price (whilst surveyor of Toxteth Park) are given by Mr. Boulnois,[149] and will be of interest :—

Average cost of construction of destructors = £525 per cell.

Cost of chimney to erect = £6 3s. 4d. per foot of height.

Height of chimney = 163ft.

Number of tons consumed per diem per cell = 6 tons.

Number of men employed per cell = 1·17.

Cost of destruction of refuse = 11½d. per ton.

Annual cost per cell = £96.

Cost per ton of burning refuse.—The cost per ton of cremating refuse in destructors will depend chiefly upon :—

(1) The type of furnace adopted.

(2) The price of labour in the locality, and the number of "shifts" per day.

(3) The nature of the material to be consumed.

(4) Interest on and repayment of capital outlay.

In many towns the gross cost can often be materially reduced by the sale of clinker, fine ash, mortar, &c.; also by the profitable application of the heat generated for raising steam for any work for which it may be required, such as driving sewage works machinery, pumping, or for electric lighting.

As a result of returns from forty-six towns, collected and published in 1894 by Mr. C. Jones, M. Inst. C.E., it was found that the expense (exclusive of interest and sinking fund on cost of works) incurred in destroying refuse is represented as varying from 3½d. to 1s. 7d. per ton; and about 10d. per ton is considered a fair average.

The average cost of burning refuse at the towns named in the above table, which is compiled from information kindly supplied to me by the Borough Engineers and Surveyors at the places mentioned, is 1s. 1½d.

Mr. Jones also says that the cost of *cremating fumes, &c.*, per ton of refuse destroyed varies from ¼d. per ton where only cinders are used to 3¼d. per ton at Ealing. At Batley, where coke at 10s. 2d. per ton is used, the cost is as high as 7d.

In an interesting report on refuse destructors prepared in June, 1896, by the Borough Surveyor of Ashton-under-Lyne is Table on page 502, showing the relative cost—per ton burnt—in stoker's wages, when *all towns are put upon the same ratio with regard to rate of wages, number of hours per day, and days worked per week.* The basis adopted is an eight-hours shift, 5½ days per week, and a rate of pay of 30s. per week per man.

The value of Town Refuse for Power Production.—The generation of steam by the utilisation of the waste heat of a destructor, although an important asset in connection with such work, should not be pursued as a matter of first importance so as to in any way impair the efficient performance by the furnace of its primary functions as a *refuse destructor.* The proper course, doubtless, is to make the destructor as perfect as possible *as such*, afterwards passing the gases (subsequent to their having fully performed their work in the furnace) through a suitable boiler, and taking the result for what it may then prove to be worth, which in high-temperature destructors is found to be sufficient to effect a considerable saving when steam power is required for pumping, lighting, or any other work.

The primary considerations requisite for a perfect destructor include the following :—[150]

(1) The temperature attained should be sufficiently high.

[149] "Municipal Engineers' Handbook.

[150] Report on "Dust Destructors," London County Council, May, 1893.

TABLE.

Name of city or borough.	Type of destructor.	No. of men to be employed.	No. of shifts per day.	Rate of wages per week.	No. of cells.	Tons per day per cell.	Days per week worked.	Cost in wages per week.	Tons of refuse per week.	Cost per ton destroyed.
				s.				£ s.		d.
Oldham	Horsfall's	6	3	30	6	7	5¼	9 0	221	9¾
Royton	Warner's	3	3	30	3	5	5¼	4 10	79	12⅛
Leeds	Horsfall's	12	3	30	12	7	5¼	18 0	441	9¾
Bradford	Fryer's*	12	3	30	12	7	5¼	18 0	441	9¾
Warrington	Beaman and Deas'	6	3	30	2	18	5¼	9 0	189	11⅛
Toxteth Park	Fryer and Boulnois'	7½	3	30	6	7	5¼	11 15	221	12¾
Liverpool	Fryer and Boulnois'	16	3	30	12	8	5¼	24 0	504	12¾
Liverpool	Fryer's	23	3	30	10 2	7 8½	5¼	33 15	457	17¾
Dewsbury	Beaman and Deas'	6	3	30	2	15	5¼	9 0	158	13¾

* Fitted with forced draught.

(2) The duration of exposure to a high temperature should be sufficiently long.

(3) *All* the vapour escaping from the refuse should be heated to a sufficient extent, and there should be no possibility of the escape of any undecomposed vapours into the chimney shaft.

The first requirement implies the use of a forced draught, and the second indicates the impossibility of placing boilers over the hottest part of the furnace, so as to enable them to best utilise the full calorific value of the burning refuse, as the temperature of the furnace would be materially reduced by placing a large mass of comparatively cold water directly over the fire. It should therefore be borne in mind when comparing the evaporative value of towns' refuse with that of coal as used in connection with boilers, that the former cannot be utilised under similar conditions to the latter without impairing the value of the destructor.

In regard to the theoretical calorific value of refuse burnt under the most advantageous conditions for purposes of steam production, Professor Forbes, in his Cantor Lectures before the Society of Arts, 1892, said, "Now it will strike you, as it has struck me, as a very wise provision of Nature, when I tell you that *if* that refuse (at Paddington) were *properly burned*, and *if* it were *used in the most economical way*, it would be found that (assuming the proportion of lighting required for such a population to be, as has been very generally assumed, one lamp per head[151]) the amount of refuse provided by any population is almost exactly as much as is required to supply the illumination by means of the electric light to that same population."

In actual destructor practice, however, refuse is not burned under the favourable conditions assumed above, and the practically attained results do not reach anything like the theoretical estimate.

Mr. J. Tomlinson, B.E., A.M.I.C.E., has deduced, from results experienced at various destructor installations throughout the country, the following statement of the power available for external work, put in each case in the form of I.H.P. continuously per cell, consuming six tons per day of twenty-four hours:—

Batley	8½	I.H.P.
Birmingham	50	,,
Blackburn	5½	,,
Bury	3	,,
Ealing	4	,,
Hastings	5	,,
Hastings (with cremator)	10	,,
Liverpool	4	,,
Southampton	4	,,
Warrington	8½	,,

The high result obtained at Birmingham, where from several tests it appeared that 1 lb. of refuse evaporated 1·79 lb. of water, is explained by the fact that "it was necessary there to keep up steam for the treatment of the excretæ, and steam was got up from these furnaces *by putting the boilers directly over the furnace*. In consequence of this, the combustion is extremely imperfect. The large cooling surface of the boilers impedes the combustion in an effectual degree. In most cases where boilers have been used to generate some steam, the boilers have been put away, and after the gases have passed through the flue they then pass by the boiler, and the error has been in the opposite direction."

In a report on the proposed electric lighting for the borough of Ipswich in regard to the question of a combined destructor and electric light station, Professor Kennedy observes that "it is very easy to overestimate the saving in fuel which can be effected by combining an electric light station with a destructor, yet there is no doubt that some economy will result from the combination, and this is a point which is worth while keeping in mind." Upon the same point the borough engineer, in his report[152] on town refuse destructors, expresses the opinion that whatever the available power for electric lighting may be, it could not be constant owing to necessary stoppages for repairs and other purposes; therefore, an electric light installation, if designed in connection with a destructor, should be complete in itself, but at the same time so arranged that it could take advantage of the heat when available.

Mr. Druitt Halpin has recently introduced a patent process of storing surplus heat, the object of the invention being, instead of generating electricity

[151] One 8-candle power lamp per head for two hours for every night of the year.

[152] March 16th, 1896.

and adopting expensive storage, to store the power which produces the current; the basis of the system being the storage of heated water under pressure in "reservoirs from which steam is taken, through a pressure-reducing valve, when and how required." Halpin's system has been installed at the Shoreditch Destructor and Electric Light Works, and is said to be especially applicable where heat is used from a refuse destructor.

The surplus heat of destructors has been applied not only to purposes of electric lighting, but also to driving mixing machinery at sewage disposal works, air compressing for sewage sludge plant, driving mortar mills, lifts, chaff cutting, pumping water, &c. At Eastbourne the boiler power required for operating the air-compressing engines, in connection with the "Shone" system of drainage, is supplemented by this means.

The relative value of town refuse and furnace coal, as steam producers, has been variously stated. Practical results, of course, depend upon the quality of the refuse and the conditions under which it is burned. Average refuse is frequently stated at about one-tenth the value of good furnace coal; but at Birmingham, where multitubular boilers are set in such a manner as to form the top of the furnace, it is found in practice that 1 lb. of refuse will evaporate 1·79 lb. of water; that is to say, that as a steam producer the refuse is about one-fifth the value of an equal weight of coal.[153]

THE CHEMICAL AND BIOLOGICAL ANALYSIS OF WATER.

By T. H. Pearmain and C. G. Moor, M.A. (Cantab).

Members of the Society of Public Analysts. Authors of "Applied Bacteriology;" "The Analysis of Food and Drugs," &c.

It is now universally acknowledged by sanitarians that a proper supply of unpolluted drinking water is one of the most essential conditions to ensure the health of the community. This being so, it is one of the first duties of the Sanitary Authorities to see that this is provided to every house under their jurisdiction. Most of our large towns are provided with a more or less satisfactory public water supply, but the larger proportion of the population who are resident in villages and isolated dwellings all over the country are dependent upon water supplies derived generally from shallow wells, which in many cases are grossly polluted. This state of affairs is all the more serious in view of our certain knowledge of the conveyance of disease by means of polluted water supplies. One is frequently met with the retort from ignorant persons that such waters have been drunk without harm from time immemorial. Although water contaminated with sewage has been, and is still, drunk by a large number of people apparently with impunity, yet such dangerous waters may at any moment become positively injurious to the health of the persons using them. It is now well known that polluted water is the most important agent in the conveyance of typhoid fever. The slightest contamination of a water supply with the dejecta from a single case of enteric fever has in many well-authenticated instances caused widespread epidemics of the disease amongst those persons who have used the contaminated water supply, as witness the recent epidemics at Worthing and Maidstone.

The object of water analysis is, as a rule, to ascertain the suitability of a water from a particular source for drinking and other purposes. In judging of the suitability of a particular supply it is advisable to ascertain its history as far as possible —that is, the character of the geological strata from which it is derived, the relative positions of possible sources of pollution, such as cesspools, churchyards, stables, &c. This information is frequently withheld by persons submitting a sample for analysis for fear of biassing the analyst's opinion, and thus information that might have been of use is often wanting.

In the absence of the history of a water we have generally to rely on the information we are able to gain from the three methods of examination, which we place in the order of the importance we attribute to them:—

(1) Chemical analysis.
(2) Biological examination.
(3) Physical examination.

The first point to be clearly grasped is that neither any one, nor the whole of these methods, applied to a single sample, or to a few sporadic samples of water, can warrant the fitness of a water supply for drinking purposes. The analysis of such sample or samples may disclose sufficient quantities of substances or bodies of suspicious origin to show that the water is unfit for consumption, or, at least, that it is either derived from sources liable to convey infective material or contains poisonous substances. It may, however, give no such positive results, and this circumstance may be due either to the fact that the water is either pure in itself and not open to pollution, or to the fact that at the time at which the sample was taken no pollution happened to be drawn or forced into the supply. The latter interpretation is very frequently the correct one; and the danger which attends it, if it be not recognised by the Sanitary Authorities, is that due to false confidence, and has been responsible for some of the most serious water-borne epidemics. The means of protection which are available through analysis are due to two facts. When infective organisms are introduced to a water initially proper for consumption, these organisms do not come alone, but are usually accompanied by chemical substances and by other organisms which alter the chemical and biological composition of the water in a manner to be detected by analysis. When no substances which are infective or liable to convey infection are introduced into a water supply, its composition is usually found to be practically constant. It is possible, by taking observations over a sufficient period, to determine whether the composition of a water supply is constant or variable; and before it can be warranted as safe, it must by such systematic and continued examination have been shown to be of practically constant composition in all its factors.

Each of these methods of examination of water has its own special importance, but it may be as well to indicate the information which is gained by these methods of examination. Undoubtedly the chemical examination is the most important, indicating the presence as it does of the smallest

[153] Report on "Dust Destructors." (L.C.C., May 10th, 1898.)

trace of organic matter, and thus indirectly pointing to possible dangers to health.

It allows more accurate and delicate quantitative determinations than are possible by the other methods; and it permits a far larger number of independent factors to be accurately estimated, so that the chance of detecting variation in composition, which is the most important sign of danger in waters which may sometimes or usually be safe, is considerably greater than by other methods. Its least merit is the certainty by which directly poisonous, as distinguished from infectious, material is detected; for such material is of rare occurrence. In the same way, but not for the same reason, it may be said that the least merit of bacteriological examination is the direct detection of specific infective organisms. Where such organisms are detected the supply is, of course, to be condemned. But it must be remembered that infective organisms are not dissolved in the water and uniformly distributed over it. They are solid bodies floating in it, and as only a very small sample of the total supply is examined, they may be present in the supply and absent from the particular samples chosen. They are also in all cases accompanied by other organisms, some much better capable of growing in water; and when they reach the analyst they may be so far attenuated that they fail to develope in his media, and though present may escape recognition. The chief merits of bacteriological examination are two. On the one hand, it furnishes a factor capable of quantitative estimation by which variations in the composition of the supply may be detected. On the other hand, it enables organisms which, though themselves indifferent, are usually introduced with infective material to be detected.

It also enables us to control the working of water filters. Respecting the information that we may gain from the microscopic examination of suspended matters, it must be remembered that while we may sometimes find such bodies as epithelial scales, undigested muscular fibre, and the like, which may lead us to suspect pollution with sewage or other putrescible matter, yet in most cases of waters from towns such substances will be filtered out of the water; this will also happen in the case of well waters, so it is only occasionally that this method of examination will render assistance to the analyst.

The microscope also permits the recognition of organisms different from and of larger size than those which are known to be infective. Some of these are directly diagnostic of the sewage which is the ordinary vehicle of infective material, and where the supply has been filtered, the presence of any such larger organisms is evidence that the filter would have been unable to arrest the more minute organisms of infective disease, and that the protection intended to be obtained by the filtration has at least, for the time being, been illusory.

There is no great difficulty in performing the operations involved in water analysis, but the power of correctly interpreting the analytical results is only to be attained by very considerable amount of training and practice.

A satisfactory drinking water should be practically free from organic matter, and should neither contain nor have the power of dissolving poisonous metals, and should be free from excessive hardness. Regarding the first of these requirements, freedom from organic impurity, it was clearly recognised as dangerous to drink water polluted with excrementitious matter long before the precise nature of the danger was known.

Water is a compound of hydrogen and oxygen; the composition of pure water is as follows: by weight, oxygen, eight parts; hydrogen, one part; by volume, oxygen, one part; hydrogen, two parts. Up to the close of the eighteenth century water was considered to be an elementary substance, until its compound nature was demonstrated by Cavendish.

Water is a clear transparent fluid, colourless, but of a blue colour when seen in bulk. Below 0 deg. Cent. it freezes and crystallises in rhombohedra, and in six-sided prisms. At 100 deg. Cent., and Bar. 30in., it boils, having a vapour possessed of the same elasticity as the air. Vapour density, compared with the air, 0·625; compared with hydrogen = 9.

Water attains its maximum density at 4 deg. Cent.; specific gravity of ice, 0·94. Increased pressure, of course, raises the boiling point, as does also the presence of solids in solution.

In this series of articles, we propose dealing with the subject under the following headings:—

Classification of Natural Waters.
Physical Examination.
Chemical Examination.
Bacteriological Examination.
Sources of Pollution of Potable Waters.
Interpretation of Analytical Results.
The Character and Purification of Various Water Supplies.

The term pure cannot be applied to natural waters in its strict sense, but only relatively, since absolutely pure water does not exist in nature. All potable waters are contaminated with impurities to a greater or less degree. Owing to the remarkable solvent power possessed by water, the number and variety of substances which it can take into solution greatly exceed that of any other liquid. In addition to its great solvent power for many saline and gaseous bodies, it has considerable solvent power for many of the constituents of the rocks and strata composing the earth's crust. We may classify the constituents and impurities of natural waters as follows:—

Gaseous.—Carbonic acid, oxygen, nitrogen.

Solids (*Mineral*).—The carbonates of calcium and magnesium, sulphates of calcium, magnesium and sodium, chlorides of sodium and potassium, silicates.

Solids (*Organic*).—The products of the decomposition of animal and vegetable matters.

In addition to these, waters are liable to contain more or less insoluble and suspended matters, consisting of mineral matters, such as sand, clay, oxide of iron, chalk, &c., or of living and dead vegetable and animal matters consisting of algæ, moulds, bacteria, hairs, cellular tissue, fibres, insects, infusoria, epithelial scales, fæcal *débris*, &c.

Natural waters can be divided into five classes:—

Rain water.—This includes all water derived direct from the atmosphere, such as rain, snow, hail, and dew.

Surface water.—Waters derived from lakes, ponds, rivers, and streams.

Subsoil water.—Waters percolating through the

soil or rocks, at no great distance from the surface, and lying between it and the impermeable stratum.

Deep well or artesian water.—Waters obtained by means of borings at a considerable distance from the surface, and coming from below the impermeable stratum.

Sea water.—Generally speaking, we may arrange the various sources of supply of potable water in the following order with regard to purity:—

Rain water (collected under proper conditions).
Deep spring and artesian well water.
Upland surface and moorland waters.
Subsoil water (if collected distant from any source of pollution).
River water.
Land springs.
Surface water from cultivated lands.

RAIN WATER.

This is the purest form of natural water, if collected under proper conditions in the open country. Rain water contains only a trace of solid matter, and is therefore perfectly soft; but it contains frequently large quantities of ammonia, together with traces of nitrates and nitrites. The traces of solid matter are, of course, derived from the dust and other matters contained in the atmosphere. The rain water from the neighbourhood of large towns is very impure, containing as it does large quantities of soot, sulphurous acid, and other products of combustion.

The rainfall, which in the first instance is derived from the ocean by evaporation, is the original source of all our water supplies. The amount of rain falling in the London district averages less than 25in. in the year, but this gradually increases in other parts of the country till in some excessively rainy places, such as in North Wales, Cumberland, and the north-west of Scotland, it is greater than 75in. annually. Let us consider what 1in. of water means. If an acre of land were covered with water to the depth of only the tenth part of an inch, that layer would weigh more than 10 tons: thus 1in. of rain is ten times that amount; in fact, very nearly 101 tons. A rainfall during the year of 25in. corresponds to 2525 tons of water per acre.

Rain water should be caught upon properly prepared artificial surfaces made of slate or cement, and the first runnings should be separated by means of a Roberts separator. Rain water owing to its soft character has a great tendency to act upon leaden pipes and cisterns, becoming charged with this poisonous metal. In districts near the sea, rain water will be found to contain very appreciable amounts of chlorides. The River Pollution Commissioners in their report give a lengthy table of analyses of seventy-eight samples of rain water, and of eight samples as ordinarily collected and stored in tanks. The following are the averages of their results:—

	(In grains per gallon.) Fresh rain water.	Tank water.
Total solids	2·76	16·8
Chlorine	0·004	0·78
Hardness	0·42	7·9
Nitrogen as nitrates	0·43	0·78
Free ammonia	0·035	0·08

Where rain water has to be collected from the roof for drinking, it may be necessary to calculate how much can be expected from this source. To take an example, if the rainfall were 24in. per annum, and the roof (which should be slate or tiles) were 60ft. by 20ft., we should in a year get 60ft. by 20ft. by 2ft., or 4800 cubic feet, or 28,240 gallons, theoretically. In practice, however, the loss due to evaporation is considerable; and to obtain the water fit to drink it would be essential to employ a rain-water separator, an ingenious arrangement which discards the first few gallons of roof-washings, and after the roof has been well cleansed the rest of the shower is diverted into the store tank for use.

In the above case, if we imagine the cottage to contain six persons and that one-third of the water is lost, we shall have 18,826 gallons per year, or about 8·6 gallons per head per day—not a very liberal allowance.

Where rain water is to be collected for use, the keeping of pigeons is, for obvious reasons, a very undesirable practice.

(*To be continued.*)

WIMBLEDON SEWAGE WORKS.

We referred in our last issue in a brief report to the successful meeting of the Municipal Engineers' Association held at Wimbledon on the 30th ult. The opportunities offered to the members of inspection of works in progress were considerable, and of more than passing interest. Not the least interesting of these were the sewage works of the Wimbledon Council, which have been often referred to as being carried on with a considerable measure of success, notwithstanding that the greater portion of the farm is covered with stiff clay. It appears, however, that in many respects Wimbledon might with advantage copy the more modern systems of sewage treatment so successfully adopted by other towns, and with profit to themselves. To particularise we refer to the unscientific construction and working—in the light of our present knowledge—of several acres of ballast filters which are evidently copied from the Friern Barnet filters, designed by that eminent engineer Mr. Baldwin Latham, some ten years ago, and which he is now discarding, we believe, for the most modern system of treatment, and to which he has become an adherent.

The efficiency and work of the Wimbledon filters is, it appears to us, seriously impaired by the mode of application of the sewage, and by covering the ballast with the clay soil transferred from the farm lands, which not only prevents the necessary access of air into the body of the filter, so essential for bacterial development and purification, but also clogs the surface and reduces the rate of working to a very serious degree without producing any correspondingly increased purification of the effluent. The Council are also encumbered, like so many other Councils who have embarked in sludge-pressing, with the accumulation of sludge which has no marketable value, and it is proposed to destroy it in a refuse destructor which is about to be erected—a somewhat circuitous and costly method it cannot, we think, be gainsaid.

Altogether we are reluctantly obliged to come to the conclusion that Wimbledon is scarcely abreast of the times in its system of sewage disposal, and its representatives would do well to learn what other towns, such as Manchester, Leeds, Croydon, and numbers of others are doing in regard to bacterial purification of sewage.

TYPHUS, TYPHOID, AND ENTERIC.

By Edward F. Willoughby, M.D.

It was unfortunate that Louis, when insisting on the specific difference between true typhus and that form of fever in which, amid a great diversity of other phenomena, a definite lesion of the intestines was always present, and which, though known by a number of more or less trivial names, had hitherto been generally confused with typhus, should have selected the name of typhoid, or like typhus, for a disease that, as he rightly maintained, was in its etiology, pathology, and phenomena wholly unlike it. The designation enteric, expressing a fact, that of the inflammation of the enteric glands is in every way unobjectionable, and ought to supersede all others. But while in this country, in France, and Italy the older designation "typhoid" holds its ground in the popular language, and to a great extent, too, in that of the profession, the Germans, who certainly are not under ordinary circumstances averse to word building, whether with materials of home or of foreign origin, adhere with strange pertinacity, inconsistent with their usual scientific habits of thought, to the old nomenclature, at the cost of continual confusion and misunderstandings. In German statistics typhus stands for enteric fever, though in medical works, when it is necessary to distinguish between them, the one is called "fleck typhus," *i.e.*, spotted typhus, and the other typhus abdominalis or ileotyphus, as if they were still looked on as varieties of the same disease. This confusion is now infecting other languages for the usual appellation of enteric fever in German being simply "typhus," the bacillus discovered by Eberth and Gaffky is *B. typhosus*, and it is thus commonly designated by English bacteriologists, though the name should be reserved for that of true typhus, which may at no distant date be identified, as the bacillus of the plague has been within the last few years. This would reduce the German nomenclature to a dilemma, to avert which by an international agreement to use the names typhus and enteric only, retaining typhoid solely as an adjective descriptive of the well-known aggregate of symptoms frequently observed in pneumonia, septicæmia, and other febrile states, as well as in the specific fevers generally, would be a worthy achievement of the next International Congress of Medicine.

THE MANCHESTER REPORT ON SYSTEMS OF SEWAGE PURIFICATION.

(Continued from page 484.)

The iron-water station is situated below the liming station, and about 300 yards from the precipitation channels. It comprises sheds for storage of proto-sulphate of iron, with engines, boilers, and pumps for lifting water into mixers, also distributing pipes for conveying the iron solution into the sewage. In this station there are two 6-horse power Robey horizontal engines and locomotive boilers, driving shafting, wash mills, iron mixers, and rotary 6in. water pumps, &c.

Near these works are a superintendent's house, and twelve cottages for those workmen whose presence on the works is necessary. There is a light railway with two locomotives and wagons for conveying coal, lime, and iron from one part of the works to another. The establishment, including liming station, &c., extends over an area of 83 acres 2 roods 27 poles. It was completed in July and August, 1889, at a cost of £430,834 12s. 9d., to which must be added the cost of the engines and other machinery, amounting to £42,567. The number of workmen engaged averages 198.

In the treatment of the sewage, the requisite quantity of lime water (nearly four grains to one gallon of sewage, equivalent to ¼ ton of lime per million gallons, or 38 tons per day) is first discharged into the sewage as it flows past this station in the three culverts. The allotted amount of solution of proto-sulphate of iron is added (about one grain per gallon, making nine tons daily), then the sewage with its dose of chemicals flows into the precipitation channels, which were first constructed on the intermittent system, that is to say, when a channel was full it was allowed to be quiescent for a short time to allow precipitation of the sludge. The clarified effluent was carefully drawn off through the telescopic weirs into the old reservoir, and thence to the river through the nine channel outlets previously described. When it was necessary to remove the sludge from any channel, the large penstocks to each channel were closed, and the supernatant effluent was drawn off by the telescopic weirs, regulated from the lever house, until the sludge was reached. The sludge was then run off through a culvert into the sludge store chamber, and was lifted by centrifugal pumps for further consolidation in the sludge settling channels. The settled sludge, which contains between 87 per cent. and 92 per cent. of moisture, is run off as required into a store under the engine-house, and is pumped through a main along the jetty to the sludge boats, or may be run into a still lower store under the settling channels should there be more than the boats can discharge at sea through unforeseen delay.

Sludge vessels.—The first sludge vessel was built by the Naval Construction and Armaments Company, of Barrow, at a cost of £16,353. It arrived in the Thames at the end of June, 1887, and was named the Bazalgette. This vessel was found to work satisfactorily, and a second, with certain improvements, was ordered from the same builders. The following is a complete list of the vessels now found necessary for the disposal of the sludge :—

Name of Vessel.	Horse-power on Trial.	Length.	Breadth.	Depth.	Moulded Depth.	Cost.
		Ft. in.	Ft. in.	Ft. in.	Ft. in.	£
Bazalgette ..	900	230 2	38 2	13 8	14 6	16,353
Barking ...	1150	232 3	38 2	15 0	15 6	24,875
Binnie	1251	232 1	38 2	13 8	14 6	26,500
Barrow ..	1025	232 1	38 2	13 8	14 6	26,500
Belvedere ...	1094	232 1	38 2	13 8	14 6	26,500
Burns ...	1136	234 0	38 2	13 8	14 6	23 750

The sludge is delivered to the vessels through telescopic sludge-loading pipes, the inner and lower ends revolving upon a hollow trunnion, which allows the upper end to radiate to different levels to suit the state of the tide. The first two vessels are loaded through ordinary hatchways, and the last

four vessels are constructed with a central hopper, into which the sludge is received from the loading pipes. At the lower part of this hopper, four rectangular valves are placed, each governing the inlet to one of the four compartments into which the sludge tank is subdivided by a longitudinal and thwartship bulkhead. Each subdivision carries approximately 250 tons of sludge. Each compartment is about 61ft. 6in. long by a maximum width of 19ft., and is about 8ft. high. The bottom of the tank when empty is about 9in. above the light load line, and each vessel discharges her cargo by gravity. The minimum time taken to discharge 1000 tons through the eight valves is six minutes. Between the bottom of the tank and the bottom of the ship, a distance of about 6ft., is an air space to give the ship the requisite buoyancy; the sludge is discharged through this space by means of tubes. Forward of the sludge tanks the crew's place is formed, with berths for the seamen on one side of the ship and firemen on the other, and the space between this and the bow is occupied by ship's stores, chain locker, fresh-water tank, rope locker, and paint-room. Below the crew space and stores a water-ballast tank is formed, holding about 170 tons of water, which is pumped in or out by the ballast pump in the engine-room as required. Abaft the sludge tank is a stokehold containing two multitubular boilers, having together a heating surface of 2800 square feet, working at a pressure of 150 lb. per square inch, and the coal bunkers, which contain between 40 tons and 60 tons of coal. Further aft is the engine-room, containing two twin triple-expansion engines, each having steam cylinders 15in., 23in., and 35in. in diameter, with a stroke of 2ft. The engines indicated together about 1000-horse power on the trial trip. The engine-room contains also centrifugal circulating pumps, feed pump, 2in. feed-water make-up, lathes, &c.

Abaft the engine-room is the tunnel used for the screws and lockers for engine stores; above this are the officers' quarters and mess-room, and steward's pantry. Between the officers' quarters and the stern are battened lockers and a bath-room; below is a small water-ballast tank, which, if filled, immerses the screws deeper in the water when the ship is light. On deck forward is an anchor deck, lamp-room, steam windlass, mast and derrick loading hopper bridge; below is a room for the quartermaster's steam steering engine, a saloon containing two state-rooms, galley, and coal shoot; and above the boiler casing are two fresh-water tanks, which contain three tons of fresh water for supplying the boilers. There is a fire service, with six screwed unions for attaching hose supplied from the ballast pump, for use in case of fire, and for washing down the decks and sludge tanks. The arrangement of the Burns differs from that of the three earlier vessels, chiefly in the captain's room being on deck, and by being fitted with electric light, the dynamo being in the engine-room. Each ship is manned by a crew of twenty-three officers and men.

The ships convey the sludge to that part of the estuary some miles beyond Southend or Shoeburyness known as the "Barrow Deep," where it is distributed over a length of eight miles to ten miles in the open sea. Although the sludge can upon emergency be discharged in six minutes, in practice one hour is occupied, during which time the vessel is steaming ahead at her usual speed of 10 knots, thus distributing the sludge over a large area.

Soon after the completion of the precipitation works at Barking, it was found that the sewage would have to be screened on account of the large amount of floating substances passing through the tanks and flowing off with the effluent water. In July, 1890, the contractors commenced a filth hoist over the three lines of sewers at the liming station, in which are machinery and appliances for raising and lowering large iron cages or screens. These are duplicated, one being down whilst the other is raised and cleared. There is a refuse destructor with two cells, to burn the rubbish from the screens. These works were started on the 21st July, 1891, and cost £8488. The destructor has been much used since that time with the assistance of coke breeze, but the quantity obtained exceeds that consumed by the destructor, and a barge load per week has been removed down the river for use on agricultural land.

A small but not unimportant addition to the Main Drainage Works at Barking may be mentioned, namely, the artificial filter, which is generally known as the coke-breeze filter, and was the outcome of certain experiments made on smaller filters in 1892. The experimental work in connection with these filters has been published, and the results are generally known. It may be here explained as a bare statement of fact that the filter composed of coke breeze gave the best results. As the works are situated near the Beckton Gas-works, where large quantities of breeze and cinders are produced, and as it was found that these materials could be obtained alongside the Council's works at a cost of 3s. per ton, making two cubic yards, it was determined to make a filter of them with a superficial area of about one acre. This filter was constructed for the Main Drainage Committee by Mr. Crimp in 1893 at a cost of about £1494 2s. 5d. It consists of 3ft. of what is known as pan breeze or cinder, with a layer of gravel at the top 3in. in thickness intended to act as a weighting material.

Advantage was taken of the experience gained in working the smaller filters, and arrangements were made for the filter to be charged with effluent from the precipitation channels. The effluent can then be kept in contact with the filter for any required length of time, the purified effluent then flows off by a channel into the Thames, and the filter is again charged. As is well known, the purification of the effluent is effected by means of organisms which establish themselves in the filter and the amount of purification effected depends upon the length of time the effluent is allowed to remain in contact with these organisms. In practice it is found that a purification of about 78 per cent. of the dissolved organic matters can be effected with a contact of about two hours. The filter is worked day and night for six days of the week in periods of eight hours. In each period the filter is charged, the time occupied being about one hour, the effluent remains in contact for two hours, whilst the remainder of the time is occupied in drawing off the filtrate. The volume dealt with per twenty-four hours when the filter is in operation is 1,000,000 gallons, and, so far as present experience goes, the filter is apparently capable of continuing its function for a considerable period of time. This filter indicates that if it should ever become necessary to further purify the effluent generally as now discharged into the Thames, the object sought

to be attained might be accomplished by means of filters of the kind referred to.

The above coke breeze filter, which had a depth of 3ft., is now being raised by the addition of another 3ft. of coke breeze, so that its full depth will be 6ft., so as to give greater capacity for the organisms for further bacteriological experiments which are shortly to be commenced by Dr. Clowes, the chemist of the Council, the enlarged capacity entailing a further expenditure of £1500, making a total since its inception of about £3000.

The additional 3ft. in depth has all the coke breeze carefully screened, so that there is no fine dust, and none larger than 1in.

BARKING OUTFALL WORKS.

Description of samples.—Sewage, December 22nd, 11 a.m.—Contains greyish-brown suspended matter; has strong sewage smell. Effluent, December 22nd, 11.30 a.m.—Brighter in appearance than the sewage; contains dark suspended matter; strong, almost putrescent smell.

Analytical Numbers (*in grains per gallon*).

Oxygen Absorbed, 4 *hours.*

Sewage, shaken sample	4·51
,, settled ,, ...	3·32
Effluent	3·69

Oxygen Absorbed, 3 *minutes* (*Incubator test*).

	Before incubator.	After incubator.	Per cent. increase.
Sewage, settled sample ...	1·19	3·24	170
Effluent	1·34	2·27	120

Both samples became very foul.

Ammonia—

Free and Saline.

Sewage, shaken sample	1·85
,, settled ,, ...	1·75
Effluent	3·10

Albuminoid.

Sewage, shaken sample	·86
,, settled ,, ...	·42
Effluent	·64

Chlorine—

Sewage	13·2
Effluent	12·2

Remarks.—The sewage and effluent being taken so nearly at the same time cannot, of course, strictly represent one another. The incubator test shows the effluent to be of a highly-putrescible character, and the amount of albuminoids present is large. The sewage is chiefly of a domestic character.

Barking filter.—A sample of the medium from the coke breeze-filter was taken and examined. It was found to contain a considerable amount of organic matter capable of giving off ammonia when distilled with alkaline permanganate. On washing out with water about 5 per cent. of fine earthy material could be washed away from the coarser portions. The material had an inoffensive, earthy smell.

Barking sludge.—A sample of sludge from Barking was found to contain 89 per cent. of moisture.

(To be continued.)

BROSELEY.—The Local Government Board has refused to sanction the loan of £2750 in respect of a water supply for the town, on condition that four gallons per head per day was not sufficient.

HOW WOLSEY OBTAINED THE WATER SUPPLY FOR HAMPTON COURT.

AN interesting piece of history was published in last Saturday's *Surrey Comet*. We are told that as long ago as the sixteenth century, Coombe was noted for its fresh water springs, and when the great Cardinal Wolsey built Hampton Court Palace he determined to bring his supply of drinking water from Coombe. An elaborate and very successful method was employed for collecting the water from the various springs on the hill. There were three principal conduit houses, which still exist, one on the estate of Sir Douglas Fox, which is called from this circumstance "Coombe Springs," and two others on or adjacent to the estate of Mr. Middleton Campbell. By means of a number of underground carriers or feeders, the water was conveyed from the springs to these conduit houses, whence it flowed in separate pipes to a point not far from Norbiton Railway Station, where a junction was effected.

From this point the water was taken direct to the Palace through a lead pipe 2¼in. in diameter, which ran at a depth varying from 3ft. to 6ft. in front of what is now St. Peter's Vicarage, across the Cambridge-road, and in a straight line to the Fairfield, which is crossed, proceeding thence through Knight's-park, beneath the Hoggs Mill stream, and through Woodbines-park to the river. Here a considerable dip was necessary to take the pipe under the Thames, after which it was an easy matter to lay it through Home-park to the Palace. The water from Coombe formed the sole domestic supply for Hampton Court Palace for nearly 350 years, and was only discarded about thirty years ago.

There were two circumstances which chiefly influenced the Authorities in abandoning the Coombe supply. The increase of building on the Kingston-hill had the effect of polluting some of the sources of the supply, and it was anticipated that with a considerable addition to the number of houses in the future there would be further pollution. Another difficulty was that the barges which came up to Kingston, when they dropped anchor in the Thames used frequently to grapple and damage the lead pipe, which led to the occasional failure of the supply. Consequently a new supply of drinking water for the Palace was obtained from a branch of the river Colne, formerly known as the Cardinal's River, but now called the Queen's River. The intake is at Hampton, where the water undergoes filtration, and is thence pumped to the Palace.

By order of the Commissioners of Works, the old lead pipes between Coombe and Hampton Court Palace, which have been buried ever since the year 1520, have recently been taken up. It says much for the honest workmanship of our ancestors that these pipes were found to be in perfect condition, and very few of them had any trace of wear and tear. They included some of enormous length, as much as 200ft. being found without a joint. These old pipes are of great value, because they were made at a time when the method of extracting the silver from the lead had not been discovered, and the substantial nature of the pipes may be gauged from the fact that they average about 11 lb. to the foot lineal.

Owing to the great development of building on

the route of the pipes, it has been of course impossible to recover the whole length that passes through Kingston, as a good deal of it is covered with bricks and mortar, but the undertaking has proved a decidedly profitable one for the Commissioners of Works, who will be some hundreds of pounds in pocket by it. Incidentally, it may be mentioned that the old red-brick plug-house, which for so many years was an eyesore to people crossing the footbridge from Grange-road to Denmark-road, has now been demolished.

HOSPITAL EXTENSION AT LEAMINGTON.

THE foundation stone of the new wing of the Warneford Hospital, Leamington, was laid on Thursday, the 5th inst., with full Masonic honours, by Lord Leigh, Provisional Grand Master of Warwickshire, assisted by Bro. G. Beech, D.P.G. Master, and the officers of the Provincial Grand Lodge. The new wing is part of the original design for the extension of the hospital, and was last year adopted by Leamington as the local scheme for the commemoration of the Queen's Diamond Jubilee. The new structure, for which Messrs. Young and Hall, London, are the architects, will be built on the pavilion principle. The cost of the contract is £6760, and the greater part of this sum has already been provided.

The new wing will accommodate thirty-two additional patients, but the number of beds in the hospital will not be increased to this extent, as room will be found in the new wards for some of the patients who are at present treated in the old buildings, where the hygienic conditions are not wholly satisfactory. When the new wards are completed the entire capacity of the hospital will be increased to 125 beds. This, it is considered, will be ample for the requirements of the district for many years to come. The ceremony commenced with the opening of the Provincial Grand Lodge at Guy's Lodge, at the Town Hall, and subsequently a procession formed and proceeded to the site of the new buildings.

After a short address by Lord Leigh, Mr. J. R. Jeafferson proposed his health, and said his lordship's ideal of pleasure was to throw himself heart and soul into every scheme for the benefit of his tenantry and every one of his fellow countrymen. They were indebted to Lord Leigh, not only for his presence at the stone-laying, but for the assiduous care and interest he had always displayed in the hospital. Lord Leigh responded briefly, and proposed the health of the Mayor of Leamington, which was received with musical honours, and concluded the proceedings.

National Registration of Plumbers.—At a public meeting held under the auspices of the District Council for Edinburgh and the East of Scotland for the National Registration of Plumbers, at Edinburgh on Thursday, the 5th inst, Sir James Russell said with regard to the Plumbers' Registration Bill that every effort would be made to have it passed through Parliament. It was, however, an unfortunate thing for the public health, not to speak of the plumbing craft, that its passage through Parliament was so difficult.

QUARANTINE.

By Captain W. G. ROMERIE, Sanitary Inspector, Port of London.

QUARANTINE! To what numberless thoughts this word gives rise, what a cloud of tragedy has environed it since its first inception as the *guardien du pays*. How its memories awaken all the horrors of disease and pestilence, and, to the initiated, its cruel barbarities and anomilies. Unfortunately, although medical science has exposed its absurdities, this measure of the middle ages is still enforced in some of the *soi-disant* civilised countries, and even in some of our own Colonies. Reviewing the various pestilences which have visited Europe, dating from the plagues of 1345—50 and 1665, and to subsequent visitations, it would appear that disease has not been arrested in its course by any system of quarantine. It is true that since the year 1665, the visitations, in each case, have been less severe in their ravages; still the amelioration was more likely due to the spread of civilisation in all its phases than to any other cause.

Quarantine from time immemorial has been a one-sided measure, and has pressed most heavily on the great shipping industries of the maritime world, and proved the greatest hindrance ever known to commerce. Moreover, quarantine in its broadest sense, was never intended to be inhuman in its principles, but since its introduction the stigma of inhumanity has followed it through all its phases. To us in this country, where quarantine is a thing of the past, we can look down with no small measure of pride, and point out benefits to other nations. In taking the initiative, in banishing a measure which has done so much injury, we have been driven to relax the port regulations by force of circumstances. The great sanitary reform brought about by the Public Health Acts has instituted a state of security which is no idle dream, and the Infectious Disease Notification Act imposes a certain obligation on the community to enforce its enactments. Of late years the tendency has all been towards the modification, and eventually the total abolition, of quarantine.

By a succession of international conferences, held particularly in reference to cholera, Europe has been gradually brought to follow the lead of England and Germany. The success of this country in defending itself from cholera in 1892 and 1893, together with the calm reliance of the German Government on similar enlightened principles, produced a strong impression on the instructed intelligence of other lands, and the Venice Conference on Plague, held last spring, sounded the death knell of quarantine in Europe. Practically speaking, since 1872 quarantine has been a dead letter so far as Great Britain is concerned, and by the introduction of a short Act of Parliament entitled the Public Health Act, 1896, the old and effete Quarantine Act of 1825, and subsequent Acts modifying or extending its statutes, were swept away. Every vessel arriving from a foreign port by day is required to hoist her colours, and every vessel arriving after dark is required to exhibit a white light over the bows on reaching the boarding station. Article 25 provides that "the master of every ship infected with cholera, yellow fever, or plague, shall when within three

miles of the coast of any part of England or Wales cause to be hoisted at the masthead, or where best seen, a large flag of yellow and black borne quarterly, and shall keep the same displayed during the whole of the time between sunrise and sunset, and no persons other than an officer of Customs (or a person acting in the execution of this order) shall leave such ship until after such visit of the officer of Customs as mentioned in Art. 2, or until after the visit of the Medical Officer of Health, in pursuance of Art. 8. The officer is also empowered to detain an infected vessel, and order the master forthwith to moor or anchor the vessel as he so directs." Art. 3, "Whilst the ship shall be so detained no person (other than an officer of the Customs or a person acting in the execution of this order) shall leave the same." Art. 5, "Such detentions by the officer of Customs shall cease as soon as the ship shall have been duly visited and examined by the Medical Officer of Health; or, if the ship shall upon such examination be found to be infected, as soon as the same shall be moored or anchored." Under this order the sick are to be landed, and the vessel disinfected, to the satisfaction of the Port Medical Officer of Health, who is also empowered to detain the vessel until this been carried out. Art. 15 states, "No person on board such a ship as is mentioned in Art. 12, who has not been certified as required by that article, shall be permitted to land, unless he satisfy the Medical Officer as to his name, intended place of destination, and intended address. The Public Health Act, 1896, also provides a penalty of £100 for any breach of this Act, and a continued one of £50 per day.

This, then, is a brief summary of the regulations in force in this country. The medical and sanitary inspection, as carried out by the Port Sanitary Authorities generally, has proved of immense benefit to this country. Another great feature is that no restriction is placed on merchandise coming from infected places, and when we take into consideration the large amount of Indian imports that have come into this country since India was declared infected, it may be assumed that contagion or infection carried by cargo does not appear to exist. The modifications in the drastic quarantine regulations at Malta, so frequently issued in the past, very probably have been brought about by the influence of the Colonial Secretary. I must say, owing to these very stringent measures, a considerable amount of trade has been diverted from this industrious little colony. It is a far cry from England to that of the less salubrious climate of Mauritius and its dependencies. At different times within the present century small-pox and cholera have committed great ravages in the larger islands, but a decided improvement has set in. Judging by the elaborate quarantine regulations in force it would appear that there was a great deal of truth in the inference that the inhabitants of these islands believe that all visitations of epidemic diseases have been transmitted by vessels. Quarantine to these people has become almost a superstition.

I must refer to the wreck of the fever-stricken ship Traveller, on the Island of Rodriques, in February, 1897. About a week before sailing from a Java port an able seaman died, suffering from Java fever, the master being then apparently ill. The next death took place two weeks later, so it may be assumed that Java fever was prevalent on leaving. The mate died then, and within a few days five more of the crew died, also the captain. The responsibility then devolved on the second mate, together with the few remaining members of the crew, all more or less incapacitated by fever. On the 3rd February they made Rodriques, and anchored off Port Mathurin, flying signals of distress. They waited, but no assistance came, and fearing that their vessel would be wrecked, Mr. Ritch, the second mate, decided to take his crew on shore. A boat was launched by him and the two convalescent seamen, into which the captain's wife, Mrs. Christie, and her baby were lowered, together with the sick men. When near the shore the magistrate and a number of others rushed down to the water's edge and threatened to shoot them down if they landed, so they had to row back more dead than alive. No assistance was sent. The same night the Traveller was wrecked. Fortunately she did not go to pieces then. The Rodriques people sent a boat the next morning, and conveyed the crew to an uninhabited sand island, and kept them there for twenty-two days, living in huts made of leaves. The doctor came off in about a fortnight, and examined the shipwrecked crew through a pair of binocular glasses. Two men died at this place. As the monsoon was setting in, the sand island would likely be covered by the sea, so they were removed to the mainland. "The Rodriques people allowed the cargo salved to be landed, and therefore their aversion to the shipwrecked crew could not be explained." The district magistrate of Rodriques admitted that the delay in sending off assistance was the cause of the loss of the vessel. Too little regard has been paid to that noble seaman, Mr. Ritch, in bringing his vessel safely to port under such sad circumstances; and there are few gallant deeds in the annals of the mercantile marine which stand out in such bold relief as this instance of British pluck and endurance.

Another instance at Port Louis, in February, 1894, bears fitting comparison in point of barbarity with the above narrative. A British steamer arrived to coal. No sickness was reported on board, but she was quarantined because one death from sporadic cholera occurred at Rangoon during the week previous to her departure. During the coaling the captain fell down the hold. A report of the accident was at once made to the Port Authorities. After sixteen hours he was seen by a doctor. He died soon after admittance to the hospital on shore. During the early part of 1892 a steamer arrived in Table Bay from England with typhus fever among the steerage passengers. She was visited by the Health Officer, who, having received all particulars, ordered the master to remain in the bay, saying he was not in quarantine, but refusing pratique. Typhus fever was not an infectious disease within the meaning of the Act, but a day or so afterwards the Act was amended to meet the difficulty, and the ship was then placed in quarantine. As the discharging and loading necessitated employing labour, all the men so employed had to remain on board until pratique was granted, which was twenty-one days after the sick had been landed. Nothing was done to the passengers' baggage which came from the steerage, the seat of infection. The strangest anomaly was the fact of the passengers being allowed to land,

but the crew, among whom no sickness had occurred, were not permitted to do so until after pratique was granted. Judging from the reports issued by the Canadian Health Authorities, it would appear that sanitary reform was making good progress in the larger towns, and, although the change is marked in the province of Quebec, no apparent modification in the quarantine regulation at the mouth of the St. Lawrence has taken place, but, on the contrary, they are if anything more stringent than ever.

The case of a liner, bound from London to Montreal, in 1893, is a case in point. About a week after leaving London a trimmer was taken ill with small-pox, and isolated. On arrival thirty-five miles below Quebec, all hands, including the sick man, were mustered to pass the doctor. The doctor detected the sick man, and the steamer was ordered to an anchorage. The patient was removed to the quarantine hospital, and when the disinfection of the ship had been carried out, the whole of the crew were located on Grosse Island, taking bedding, clothes, and cooking utensils with them. In the meantime the crew of another ship came down from Montreal and took over charge ten minutes after the others had left, got under weigh, and proceeded to Montreal. About September, 1892, a different state of things was being enacted in New York, which attracted the gaze of the whole civilised world. I refer to the case of the Normannia and other vessels. It is not necessary for me to tell over again that story of misery, stupidity, and inhumanity, but it may be enough to say that, notwithstanding all that was done by way of inflicting suffering on the helpless passengers and crews, the cholera was not after all kept out of the place.

The States within the yellow fever zone are in constant dread of that disease, and frequent changes take place in the regulations. Dr. Collingridge stated "that yellow fever perhaps presents a stronger case against quarantine than any other disease. In addition to its uselessness, it is in this disease that the greatest danger arises from its exaction." Shipowners should, under the circumstances, be on the alert against quarantine restrictions, and I think the London Chamber of Commerce can supply some valuable information on this matter. During the months of June and July, 1896, sweeping charges were made by shipmasters at the port of Savannah against the drastic quarantine regulations enforced there. Captain Hammond said he arrived at the quarantine grounds on June 6th, and was kept waiting several days. While waiting he was informed by letter that the vessel had been chartered to load at Savannah. He was detained four days before he was allowed to come up to the quarantine station, notwithstanding the fact that he had a clean bill of health, and that there was no sickness on board. Captain Hammond complained that the bi-chloride solution, used in washing down the inside of his vessel, was likely to corrode the iron. He said that a lot of clothing had been ruined by the disinfecting chambers. The sleeping quarters at the station were insufficient, he said, and in bad condition. There were only sixteen bunks. He had twenty-one men. No sleeping places were provided for the officers. The report of the Sanitary Board exonerated its port Medical Officer from the charges made against him, and further stated that the other charges had not been proved. "While quarantine has been considered very onerous and a hindrance to commerce," the Commission says, "it calls attention to the fact that Savannah only quarantines against places; it does not quarantine against Jamaica and the Isle of St. Thomas, as other Southern ports do."

The Commission calls attention to the fact that the rules observed at the Savannah quarantine are the rules laid down by the United States through the Marine Hospital service. At Jacksonville quarantine is so strict that very few foreign vessels visit the coast. Had I time to relate the history of quarantine in the Brazils, I could portray some of the saddest events it is possible to think of. Since the year 1850—the year the yellow fever is supposed to have been imported into the Brazils from New Orleans—it has claimed an alarming number of victims from the ranks of our British seamen. Ship after ship has been lying at Rio de Janeiro and Santos totally swept by this disease, and crew after crew have been sent from this country at great expense to bring the vessels home. If we take into consideration the impoverished condition of the country, brought about by continual political unrest which prevails throughout the Republic, and where martial law is conspicuous by its frequent appearance, it is doubtful whether any improvement in the near future is likely to take place. The case of the British steamer Olympo affords a melancholy example of the selfishness which is practised by some so-called civilised nations, when there is any dread of epidemic. The Olympo did not take the cholera with her, but contracted it while in quarantine at Rio, where the Authorities declined to supply food to the animals that were dying of starvation on board, or medicine or provisions to the men who afterwards fell ill. No assistance was given her, and the cholera was left to burn itself out. A desperate attempt to force an entrance into the harbour and solicit help from foreign gunboats failed. The whole case is one of the most sickening and shameless barbarity. Mr. F. P. Hanson, Argentine Consul, in referring to the regulations, which are based on the time-honoured precept that "prevention is better than cure," says, "It should be remembered that our experience in the Argentine Republic of foreign epidemical diseases has been such as to oblige us to take every possible precaution against the introduction of yellow fever, cholera, &c., to our shores. In 1871 a few passengers from a yellow fever-infected country landed surreptitiously at the city of Beunos Ayres, brought on an epidemic which cost us the lives of 18,000 inhabitants. In 1886 a cholera-infected ship from the Mediterranean caused an outbreak of cholera, in which several thousands perished." As to sickness occurring on board in port he further says, "No sick person may be kept on board or removed from a ship except by authority of the Health Officer, nor may any medical man go on board for professional purposes without giving notice to the Port Sanitary Authority, and being accompanied by one of its officers, except in cases requiring surgical assistance." To place a healthy ship in quarantine coming from an Indian plague-stricken port for twenty days, and eight if she comes from a port in the Mediterranean where cholera has taken place, is, to say the least, an enormous penalty to pay. Another cause of complaint among shipmasters frequenting these ports is the fact that no medical

assistance can be obtained without permission of the Port Sanitary Authority. Flores Island, the quarantine station of this Republican State, is about twenty miles from Monte Video, and has been for years the cause of much complaint on the part of those who have undergone detention there.

A captain writes home and says:—"The arrangements on Flores Island are most scandalous, and the charges for enforced detention extravagantly high." He then relates one of his experiences. "On one occasion," he says, "I arrived there in a Pacific Steam Navigation Company's steamer, about an hour after a Messageries Maritime mail boat. The doctor having visited the latter vessel first, ordered five days' quarantine for all passengers landing. He then came on to us and would have treated us similarly, only it so happened that we had six wild bulls on board, intended for bull fighting, and having instructions that these were urgently wanted, he granted us free pratique. After which he was of course obliged to go back to the French steamer and treat her the same." It is, of course, reasonable to expect that, during the prevalence of an epidemic, more than ordinary precautions must be taken to minimise, as far as possible, the danger of importing the malady, but to impose even observation on a healthy ship, although coming from an infected district, is, to say the least, unnecessary and uncalled for. In the words of the sanitary reports, "so dreadful was once the condition of the Navy that in the year 1726, when Admiral Hosier sailed with seven ships of the line to the West Indies, he buried his ship's company twice, and died himself from a broken heart." Again, Anson's "Voyage Round the World from 1470 to 1744," forms one of the most lamentable histories of human calamity through disease ever known.

The Merchant Navy was, if anything, in a worse plight than the sister service. Improved education is making headway among the officers of the merchant service. Besides, the sanitary inspection carried out at a home port has instituted some of the principles of hygiene, with the result that cleanliness in British ships is becoming daily more noticeable. Bills of health originated, Dr. Collingridge tells us, with the Turkish merchants about the sixteenth century, and became general throughout the maritime world. Of late years, however, their value as a health passport is not quite so apparent. This has arisen, no doubt, from the fact that telegraphic communication is far more speedy and reliable now-a-days than in those days of slow locomotion. In nine cases out of ten bills of health, clean or foul, are treated as mere waste paper. A useful purpose might be served if the official log-book, which is virtually the ship's bill of health, was made more use of. For instance, at the present time, all cases of illness, injury, and death, besides the medical treatment, have to be recorded therein. Would it not, then, be of more practical use if this book was *vised* at every port by the Health Authorities, with remarks as to the health of the crew, details of disinfection, if any, and sanitary condition of the ship?

MANCHESTER.—No cases of small-pox have been reported in Manchester for a little over a year.

Sanitary Inspectors' Associations.

LONDON.

AN ordinary general meeting of the Sanitary Inspectors' Association was held on Saturday at the Carpenters' Hall, London Wall, E.C. Mr. T. G. Dee, the chairman of the Council, presided, and among those present were Messrs. H. Alexander, E. Lightfoot, S. C. Legg, Barth, Pettit, W. W. West, Ashdown, Middlewick, W. Wilkinson, Jordan, A. Duck, Taylor, Thornley, Nurcombe, Leah, and Mr. E. Tidman, C.E., the hon. sec.

MEMBERSHIP.

The Association considered at some length the applications for membership of Mr. A. Ellenden, Assistant Sanitary and Street Inspector of Kensington, and Mr. J. H. Rowe, London County Council lodging house Sanitary Inspector.

The CHAIRMAN ruled that Mr. Ellenden, having been appointed Assistant Sanitary Inspector by the Kensington Vestry, was qualified for membership, and he was duly appointed by eleven votes to ten; Mr. J. H. Rowe was held to be unqualified except as an associate member, and his application was accordingly referred to the Council for consideration. Several other members were appointed.

DOUBTFUL APPOINTMENT AT STOKE NEWINGTON.

The HON. SECRETARY reported that he had written to the Local Government Board, the London County Council, and the Stoke Newington Vestry as to the proposed appointment by the latter Authority of a Surveyor and Chief Sanitary Inspector, such appointment being held to be contrary to the spirit of the Public Health (London) Act, 1891. The Public Health Committee of the London County Council had written to the Local Government Board in support of the view taken by the Association, but from reports in local newspapers it appeared that Mr. J. G. Smith had recently been appointed by the Stoke Newington Vestry as Surveyor and Chief Sanitary Inspector, subject to his passing the examination of the Sanitary Institute. Mr. Tidman added that this appointment was clearly not in accordance with the Act, as a Sanitary Inspector must be qualified at the time of appointment.

After discussion, it was resolved to again communicate with the Local Government Board on the subject.

THE CITY SCANDALS.

The HON. SECRETARY stated that as it was rumoured that the Sanitary Inspectors of the City were concerned in the recent bribery scandals, he had written to the newspapers on the subject. The Medical Officer of Health of the City had also written stating that the officers of his department were not in any way concerned with the scandals, which were confined to the Street Inspectors.

The action of the Hon. Secretary was approved.

DANGERS TO HEALTH FROM DEFECTIVE SANITATION.

Mr. W. WILKINSON (Altofts, Yorks) read a paper on "Dangers to Health arising from Defective Sanitation." He said that defective sanitation comprised badly-designed structures, inefficient work-

manship, and defective materials, and these produced, among other evils detrimental to health, typhoid, enteric, and continued fever, with diphtheria. In old houses box drains would be found running through the basement, and these permitted sewer gas to escape into the cellar where food supplies were stored, and thence insidiously penetrate into all parts of the dwelling. Drains should be laid at right angles from inspection chamber, with a true inclination from sewer to house connection. The correct capacity in all cases should be considered, as this was the first factor for the effective working of all drains, and complete disconnections should be rigidly enforced in all outlets. The hurry to cover in drains and avoid tests was to hide defective work, and he had often advocated that no man should be permitted to lay a drain or any work in connection therewith unless he possessed the necessary qualification proved by registration or certificate obtained from a board of examiners consisting of expert and practical men. Each board of examiners should contain one or more members elected by the Sanitary Inspectors' Association. This was a safeguard against bad work, a protection to architects, builders, and themselves, and primarily for the public at large. In his opinion, the Cecil gully or trap was more effective, there being little or no room for a deposit. Much had been said for and against the intercepting trap, but everything depended upon the size of it and the construction of the drains. Hand-flushed closets should be condemned. The safety of a household depended upon the proper fixing of appliances. The dangers arising to health from bad workmanship were many; and even the best appliances might be made insanitary or imperfect by careless fixing. He was opposed to surface-ventilating grates, as well as the dangerous practice of connecting from the sewer into manufacturing chimneys. Wherever a gas ventilating shaft or sewer air destructor might be fixed, the inhabitants residing in close proximity would imagine there were dangers arising from it. The opinion had been clearly expressed by sanitary engineers that the present system of taking ventilating shafts outside houses is altogether wrong, as unless they are run up to a great height they practically act as conductors of disease. In short, there was only one way to deal with sewer gas, and that was to destroy it absolutely, which could be done by burning it in sewer gas destructor lamps. It might be urged that this applied only to such sewers as are not disinfected, but this was shown by Dr. Klein, in his report on "The Behaviour of the Typhoid Bacillus and of Koch's Vibrio in Sewage," to be erroneous. Dr. Klein showed that the typhoid bacillus was infinitely more active, and showed incomparably greater vitality in nitrate sewage than in pure sewage. This practically meant in dealing with the problem of sewers that when we flush them with disinfectants we are laying down food for our deadliest enemy—typhoid. On the other hand, if in place of putting in disinfectants destructors were inserted along the line of sewers, and the gas driven off by the decomposition of the sewage drawn out and destroyed, we should in all probability have what is at present the great desideratum, the sewage, however foul when it entered the conduits, would at the outfall be innocuous. When the expert craftsman had completed his work to the best of his knowledge and skill, under the strictest supervision, there remained for the household to faithfully observe the simple instructions, and to use the appliances with cleanliness and care. Failing this, the best sanitary work would be useless. He hoped the Authorities of cities and towns would recognise the difficult position in which a Sanitary Inspector was placed in having to perform the dual office of Drain and Sanitary Inspector, more especially when they take into consideration the many cases of infectious disease which they also had to inquire into and deal with at the same time. There was great advantage in appointing a Drainage Inspector, similar to a Building Inspector, who could then properly devote his time to the details of his duties. The healthfulness of a town, city, or district, was taken according to its immunity from fevers, and Mr. Wilkinson quoted at length the opinions of eminent authorities on the subject, and the conclusion at which he had arrived was that sewage ought to be treated in a more efficient manner than it is generally to-day. No town ought to be allowed to turn its sewage into tidal water. The habits of people with respect to cleanliness, and more especially their care to protect their habitations from pollution. was a clear indication of the progress of civilisation and sanitation. It was a deplorable proof of the want of information and of due appreciation of the importance of the circumstances on which the improvement of the moral as well as the physical condition of the population depend, the existence of filth in houses, the prevalence of dirty habits among the people, and the efforts to remedy or mitigate the attendant evils, should so often be treated with contempt, as if the subject were of no consequence or fitted only to excite disgust. It was incumbent on Local Authorities to show by the way they dealt with the problems before them that they themselves believed in the necessity of cleanliness and sanitation, and that the laws they had to administer were the practical fulfilment of the primitive laws for personal and household purification.

Mr. H. ALEXANDER (Shoreditch) moved the hearty vote of thanks to Mr. Wilkinson for his paper; this was seconded by Mr. MIDDLEWICK (Kensington), and after some remarks from Mr. THORNLEY and the CHAIRMAN, was carried with acclamation.

Mr. WILKINSON having acknowledged the compliment, the usual private conference was held, after which a vote of thanks to the Chairman for presiding closed the meeting.

NORTH-WESTERN AND MIDLAND.

THE opening meeting of the twelfth session was held at the Liverpool Royal Institution on Saturday last, the 7th inst. Mr. Wm. Stansfield (Manchester) presided, and there were present Messrs. W. Bland (Urmston), E. Worrall (Penmaenmawr), E. Roberts (Carnarvon), T. Waters (West Bromwich), W. Urquhart (Crewe), J. Mort (Lynn), N. Coates (treasurer), H. H. Spears (hon. secretary), and a number of other members from Liverpool and surrounding districts, Manchester, and West Bromwich.

Messrs. Job Robertshaw and J. Heslop, of Man-

chester, were elected members, and some additional nominations were also received.

Short discussions, initiated by Mr. J. Mort (Lynn), took place on the liability of Local Authorities to remove garden refuse placed in ashpits, and also as to the applicability of the model bye-laws to certain drainage problems.

At the close of these discussions Mr. Wm. Stansfield, Chief Sanitary Inspector, Manchester, delivered the Chairman's annual address.

Mr. Stansfield having expressed his thanks to the members for the honour conferred on him by reason of his election to the chairmanship, proceeded to make a very interesting comparison as to the greatly improved position occupied by the Sanitary Inspector of to-day compared with an Inspector appointed in 1875. When they considered the methods adopted to recruit the small army of sanitary soldiers at the time of the passing of the 1875 Act, one was struck with the fact that either the men whose duty it was to fix the salary to be offered had not risen to the importance of the subject, or that some other motives were at work. In those days it was not advisable to enforce the provisions of the Public Health Acts if Inspectors wished to retain their positions, and for these and cognate reasons satisfactory progress was out of the question. The Inspector was in many instances regarded as a necessary evil, and this was the utmost recognition he could obtain. As the years passed on Inspectors had gradually gained for themselves a more assured position ; hitherto inactive Local Authorities had moved on, if only slowly, to the betterment of sanitary administration. He considered that the rise of the Sanitary Inspector practically began when associations of sanitary officers were founded. Originally such associations were stigmatised as existing solely for the interests of the Inspector ; but it was now becoming recognised that the educational value of these movements had good results, not only upon the Inspector individually, but also the Local Authorities served and the public generally. Dealing with the increased number of duties devolving on Inspectors, Mr. Stansfield gave a list of some twenty Acts of Parliament passed since 1875, every one of which had added to his already multifarious occupations. The amount of additional work thrown upon Sanitary Inspectors by the Infectious Diseases (Notification) Act was almost incalculable, and but for the marked energy and enthusiasm displayed, the continued growth of other branches of sanitary work must have been checked. Mr. Stansfield favourably commented on the work done by the Sanitary Institute in the education and training of Inspectors, but considered that it was in the highest degree essential that at least two years' practical training as assistant to a Sanitary Inspector holding office should be the qualification necessary for all applicants for appointments as Inspectors. It went without saying that the young Inspector of to-day had many advantages over older Inspectors in point of education and training, but there were many opportunities even for those more advanced in years to acquire information and knowledge. In his opinion, by far the greatest assistance was rendered by the sessional meetings of the Inspectors' Associations, where sanitary problems were constantly under discussion, and the Inspector who wilfully isolated himself from his *confrères*, relying only on his personal experiences, laboured under most serious disadvantages. Mr. Stansfield reviewed in detail the peculiar advantages offered by the Association of which he was chairman, and referred to the almost phenomenal progress which had taken place within the two preceding years, concluding a most interesting address with a forecast of the work of the new session.

A well sustained discussion ensued, the following taking part therein :—Messrs. Bland, Mort, Waters, Coates, Spears, and Grimsley. Mr. Stansfield replied on the discussion, and the meeting terminated.

The Council of the Association has unanimously adopted the following resolution :— "That the Council of the North-Western and Midland Sanitary Inspectors' Association expresses its hearty approval of the Sanitary Inspectors' Appointment and Superannuation Bill, 1898, and requests the Council of the Sanitary Inspectors' Association to furnish the necessary information as to the probable date of introduction of the Bill, in order that no opportunity may be lost of furthering its interests."

SOCIETY OF PUBLIC ANALYSTS.

At the monthly meeting, held at Burlington House, Dr. Matthew A. Adams, Medical Officer of Health for Maidstone, read a paper on "Water Supply in Relation to the Recent Epidemic." In the discussion which followed, Dr. J. W. Washbourn, Dr. Childs, Dr. Pakes, and Mr. Stoddart alluded to the bacteriological aspects of the matter, it being admitted by Dr. Washbourn that although bacteriological examination, like chemical analysis, often showed definite evidence of animal or sewage pollution, it could hitherto in no case be said to have resulted in the actual detection of the typhoid bacillus, even in water, clearly responsible for the dissemination of typhoid. The matter was also discussed, mainly from the chemical standpoint, by Mr. Otto Hehner, Mr. Allen, Dr. Voelcker, and Mr. Cassall. The President of the Society (Dr. Bernard Dyer) referred to the assistance often afforded by bacteriological methods of examination, however imperfect they might yet be in the confirmation of chemical results in the analysis of water, saying that the water analyst who did not familiarise himself with and make use of bacteriological methods deprived himself of a material aid in interpreting the admittedly more definite results of purely chemical analysis.

Obituary.

DR. MACKINTOSH, OF CHESTERFIELD.

Dr. Angus Mackintosh, Medical Officer of Health for the Chesterfield Union, died recently, at the age of sixty-five, at his residence in Gladstone-road, Chesterfield. He had been ill for only a few days, suffering from bronchitis, quinsy, and erisipelas of the head and face. He had held the post of Medical Officer for twenty-six years. Dr. Mackintosh was a native of Blair Athol, and first practised in Cornwall. He was the author of several medical treatises.

General News.

HOME.

WHYTELEAFE.—Diphtheria has again broken out in Whyteleafe.

NORWICH.—A large isolation hospital is to be built. In the meantime temporary accommodation will be provided.

BELPER.—At the next meeting of the Rural District Council a report on the Holloway water scheme will be submitted.

GLOUCESTER.—The Council has decided to apply to the Local Government Board for £15,000 for the new infectious diseases hospitals.

CHIPPENHAM.—The Rural District Council has decided to purchase a scarifier at an estimated cost of £95, with an additional £20 for fitting.

PENISTONE.—The Urban District Council has decided to borrow £2400 on the sewerage and waterworks account, and also to purchase a new crane.

FOLESHILL.—The Local Government Board has recommended the Public Loan Commissioners to lend the District Council £1360 for waterworks at Bedworth.

HEMSWORTH.—A sum of £800 is to be spent for road repairs, and the Local Government Board has sanctioned a loan of £800 for alterations at the hospital.

BARKING.—A Local Government Board inquiry has been held recently respecting an application by the Urban Council for sanction to borrow a sum of £8250 for the erection of public baths.

TAMWORTH.—The Town Council has passed a resolution in favour of applying to the Court of Chancery for an injunction to restrain the Birmingham Authorities from polluting the river Tame.

MONMOUTH.—The seal of the Town Council has been affixed to a surrender of a lease of some cottages which had been hired as an infectious diseases hospital, and which the Mayor (the Right Hon. Lord Llangattock) wished to purchase and re-model for that purpose, and then present to the town.

BELMONT.—Owing to the continued outbreak of infectious diseases in Belmont, near Bolton, it has been decided to have a thorough investigation made into the sanitary condition of the whole township. Mr. Codling, A.M. Inst. C.E., of Manchester, has been instructed to make the inspection and report thereon.

LONDON.—Dr. W. Collingridge, the Medical Officer of Health for the Port of London, in his half-yearly statement, reports that of 14,795 visits of inspection 12,174 (82·28 per cent.) were made on vessels carrying the British flag. Since 1892 11,467 vessels have been medically inspected, or an average of about 2050 per annum. During the last half-year thirty cases of infectious disease have been discovered and dealt with. An unusually large quantity of unsound food has been seized, including 1351 carcases, 868 pieces of beef and mutton, 60 casks of horse beef, 695 cases of condensed milk, and 219 crates of bananas.

SCARBOROUGH.—The death-rate at Scarborough during the last quarter was 18·5 per 1000, against 15·4 in the corresponding quarter of last year. Respiratory diseases accounted for 35 deaths, heart disease for 22, and influenza for 20. The zymotic rate was 0·4 per 1000, against 0·7. There were 269 births during the same period.

LANCASHIRE.—Reports were submitted at a recent meeting of the County Council showing the great progress made in the technical teaching of the various arts and industries, and of agriculture. Emphasis was laid on the immense value of a series of experiments which have been conducted at the experimental farm for the suppression of tuberculosis.

HEYWOOD.—At a special meeting of the Town Council last week a resolution was confirmed authorising the Corporation to obtain permission to introduce into the Heywood Corporation Water Bill, now pending in the House of Lords, additional provision, providing for the constitution of a Joint Water Board, consisting of representatives from the boroughs of Heywood and Middleton, to manage the water undertaking for the two boroughs.

TAMWORTH.—Dr. Fausset, Medical Officer of Health, in his annual report, just issued, states that the deaths of infants under one year of age within the borough during the past year was equal to a death-rate of 193 per 1000, against 137 per 1000 last year. This is the highest infantile mortality registered within recent years. In many cases death had been brought about by carelessness, either in regard to exposure to cold or ignorance. This distressing subject is one of vital importance to the well-being of the inhabitants, and every effort should be made to discover and remedy the causes which keep up the rate of infant mortality so abnormally high, in spite of all the sanitary measures which have hitherto been adopted with the object of improving the health of the community and lowering the general death-rate.

MALDENS AND COOMBE.—The principal portion of Dr. Davison's report at the last meeting of the Council dealt with the nuisance at the Beverley brook. He stated that complaints had been received as to the offensive condition of Beverley brook, and he had, in company with the Surveyor, made an inspection of the brook. The stream gave off foul and offensive smells, and for the last fifteen months the householders in the neighbourhood had complained that the smells penetrated the closed doors and windows of their homes. The occupiers of land adjoining the brook also made complaints. The smells might produce disease, and the state of the brook was causing an interference with the watercourse, owing to the accumulation of matter. These things could be dealt with under the Public Health Act. He was convinced, after having made an inspection with Mr. Davison, that the nuisance was not caused in Coombe, but that it came from an adjoining district. The arrival of hot weather would increase the nuisance. As the responsible Authority had failed, after fifteen months, to prevent the pollution of the stream, so deleterious and damaging to the district, he (the Medical Officer) considered that the time had come when steps should be taken to remove the stigma on the sanitary reputation of the district, which was in all other respects one of the healthiest in the county.

KINGSTON-ON-THAMES.—The Town Council, at its last meeting, resolved to make application to the Local Government Board for its sanction to an additional loan for bath purposes, estimated to amount to between £1100 and £1200, in respect to the additions made subsequent to the original contract.

GATESHEAD.—The Board of Guardians has resolved to present a petition against the Vaccination Bill at present before Parliament, "praying that any rules and regulations to be made by the Local Government Board respecting vaccination shall not have legal force or effect until the same have been submitted to and approved by Parliament."

CHELSEA.—At a recent meeting of the Vestry Dr. Louis C. Parkes, the Medical Officer of Health, presented an important report, in which he stated that during the past five months an epidemic of measles had been in progress in Chelsea, which up to date had caused the deaths of some seventy persons in that parish, the victims being chiefly young children under five years of age. Dr. Parkes urged the Vestry to concur in the action suggested by the School Board for London to the London County Council that the latter body should by order schedule measles in the list of dangerous infectious diseases.

ABROAD.

COOLGARDIE.—With reference to the Coolgardie water scheme, the engineer-in-chief (Mr. C. Y. O'Connor) states that he has already cabled to England to the effect that he has been told that the seamless pipes which are being manufactured in Adelaide are a great success, and that therefore the specifications for the Coolgardie water scheme pipes must be such as to permit of this style of pipes being adopted, if it is found that they are as great a success as stated. He has intimated to the Commissioners in England that in plenty of time before the tenders are due to come in, he will go to Adelaide and see these pipes made and tested of a size such as will be needed for the work. Provision has accordingly been made that that kind of pipe can be tendered for, and of course, if found quite satisfactory, and considerably cheaper than the other types, as stated by the patentees, there is no reason why it should not be adopted.

NUWERA ELIYA.—Mr. S. M. Burrows, the chairman of the Nuwera Eliya Board of Improvement, has issued the following notice to householders:—"It appears to the Board of Improvement to be advisable to take extra precautions in the matter of the disposal of night soil, partly because another outbreak of typhoid fever would be a very serious affair for Nuwera Eliya, chiefly because the ravages of the plague in India are a warning to all towns in the East to be exceedingly careful as to sanitation. The Medical Officer and the Board Inspector will endeavour, during the next few months, to visit every house in Nuwera Eliya, and inspect the arrangement made for the disposal of the night soil. It is impossible to make exceptions and visit some houses and not others; and I am sure I may ask you to give them such assistance and information as they require when they visit your houses, for the present is a time when we must all submit to rather more stringent regulations on sanitary matters, when the neighbouring Continent is teaching us such a terrible lesson on the subject."

Personal.

MR. J. A. BEYNON has been appointed Inspector of Nuisances for the rural district of Frome.

MR. G. W. MCQUINN has been appointed Sanitary Inspector for the Holborn sanitary district.

Mr. G. COOPER has been appointed Inspector of Nuisances for the rural district of Glossop Dale.

MR. R. H. WILKIN has been appointed Medical Officer for the fifth district of Thingoe union.

MR. MAURICE COOMBE has been appointed secretary of the Newport Plumbers' Trade Union.

DR. P. L. BENSON has been appointed Medical Officer of Health for the rural district of Buckingham.

MR. D. H. ATTFIELD has been appointed Medical Officer of Health for the urban district of Watford.

MR. J. H. MARSH has been appointed Medical Officer of Health for the urban district of Little Hulton.

MR. J. FULLER has been appointed Medical Officer of Health for the rural district of Long Ashton.

MR. CHARLES DICKINSON has been appointed Inspector of Nuisances for the urban district of Prescot.

MR. A. S. RANSOME has been appointed Medical Officer of Health for the urban district of Southgate.

MR. WM. STEPHENSON has been appointed Medical Officer of Health for the rural district of Beverley.

MR. JOHN S. BRUN has been appointed Inspector of Nuisances for the urban district of Oystermouth.

DR. A. MAXWELL WILLIAMSON has been appointed to the new office of Chief Sanitary Inspector for Edinburgh.

DR. JAMES LAWRENCE has been reappointed Medical Officer of Health for Darlington for a further period of three years.

MR. JAMES FIELD, of the Health Department, Sunderland, has been appointed Assistant Sanitary Inspector to the Rochdale Urban Authority.

Sewerage Schemes.

[To MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

AN additional £3000 is required to finish the Portishead sewerage scheme.

THE Local Government Board has sanctioned the application of the Farsley Urban District Council for permission to borrow £15,700, the estimated cost of the sewering and sewage disposal of the district.

THE Local Government Board has consented to a loan of £5300 for sewerage works at Oadley.

THE Town Council of Stockport has decided to apply to the Local Government Board for sanction to borrow over £50,000 for the reconstruction of main roads, sewerage purposes, and public improvements.

THE Gomersal District Council has received a draft Provisional Order from the Local Government Board empowering it to take a plot of land on the Oakwell estate for the purposes of sewage outfall. It appears that the owners of the estate had offered an alternative site, but that on the advice of the engineer to the Council it had been decided not to accept it.

AT a recent meeting of the Pontefract Town Council, the Mayor gave the result of the visit of a deputation to Exeter to inspect the septic system of sewage treatment. The sewage passes into a tank, developes bacteria which destroy it, and then consume themselves. The Council decided to adopt the system, at a cost of about £300. The existing sewage works will be used, and all that will be needed will be acquisition of septic tanks.

A LOCAL Government Board inquiry has been held at Aldeburgh with respect to the proposal of the Town Council of the borough to borrow £11,000 for the purposes of sewerage and sewage disposal. The scheme is a very expensive one for so small a population, but, when the works are completed, the engineer is of opinion that the town will be well sewered, and the sewage will be disposed of without nuisance or annoyance to anyone or the least pollution of the river Alde.

AT the last monthly meeting of the Whitby Urban District Council, the question as to the desirability of the completion of the sewerage system of the town came up for consideration. Mr. W. Brown gave an exhaustive *résumé* of the different schemes for completing the sewerage system which had been before the town during the past twenty-three years. It was finally decided that the question be referred to the Highways and Sanitary Committee for consideration and report in connection with a bridge scheme.

AFTER the ordinary meeting of the Derby Town Council last week the members met in Committee to discuss the difficulty which has arisen between the Borough and County Council in reference to the alleged pollution of the Derwent by the town sewage. A communication had been received from the County Councils, embodying certain conditions under which they are disposed to defer any legal proceedings while the Corporation continues its investigation with reference to a more perfect sewerage scheme. The Corporation is prepared to virtually accept those conditions, and the Mayor is to have a further interview with Lord Waterpark, the chairman of the Public Health Committee of the County Council, and to arrange terms to be binding on both parties.

THE Sewerage Committee of Aberdeen Town Council recently had under discussion a request by the District Committee of the County Council to be allowed a connection with the city sewers for ground at Mannofield, outside the city boundary. It was remitted to the Burgh Surveyor to report on the subject.

Lighting.

A NEW gas-testing and gas-meter department of the London County Council is to be opened shortly iu Rosebery-avenue.

THE Keighley Corporation Gas Committee is preparing to apply for a Provisional Order empowering it to supply the electric light.

THE St. Anne-on-Sea Gas Bill was before the examiners on Friday last, and it was reported that the standing orders had been complied with.

A LOCAL Government Board inquiry has been held at Bolton into an application of the Council to borrow £100,000 for gasworks extensions, renewal of mains, &c.

THE Leyton District Council has decided to adopt a scale of charging for the electric light based upon what is known as the Brighton system, under which the price per unit paid for the light varies in accordance with the average number of hours per day customers use it.

THE work of introducing the electric light into Leith was formally begun on Wednesday, the 4th inst., by Bailie Manclark. The engineer, Mr. Bryson, has not adopted the culvert system in laying the cables, but is putting them into the earth and protecting them on the top with iron plates. The cost of the whole undertaking is estimated at about £30,000.

DURING the quarter ending March 31st the Coventry Electric Light Department supplied 35,090 units of currents, as compared with 21,516 during the corresponding quarter of last year. The rentals amounted to £891 4s. 5d., as compared with £547 6s. 5d., while the number of consumers increased from 76 to 112. There had been an increase in the mileage of high-tension mains of 1255 yards, and in the low-tension mains of one mile 359 yards.

AT a recent meeting of the Morley Town Council, Mr. Robert Hammond, of London, consulting engineer, reported on the public electric lighting scheme recently inaugurated. It appeared that the amount sanctioned by the Local Government Board was £22,500, and that up to the present the Corporation had committed itself to an expenditure of £20,764, leaving a balance of £1735 10s. 2d. of the original scheme still available for mains, extensions, &c.

HAVING regard to the action of the Gas Light and Coke Company in raising the price on the north side of the Thames, the Board of Works for the Holborn district, in co-operation with the Vestries of Clerkenwell and St. Luke, has decided to convene a great public meeting in the Holborn Town Hall on Wednesday, 25th inst., to protest against such increase, and urge upon the Government to hold an inquiry into the working and management of the company. Sir Albert Rollit, M.P., has consented to preside, and will be supported by the local members of Parliament, of the London County Council, and the School Board, and many other well-known gentlemen in the North of London.

ON Friday, May 6th, without any public or formal ceremony, the longest piece of roadway lighted by electricity in England was so illuminated for the first time. The road, which runs from the fire brigade station at Hampstead, close to the heath, to Tottenham Court-road, has for a part of its length been lighted by electricity for some considerable time, and by an agreement between the Vestries of St. Pancras and Hampstead arc lamps have now been carried from Camden Town to the foot of Haverstock-hill, while the Hampstead Vestry has similarly lighted the remainder of the road in question. The length of road lighted, which runs in an almost straight line, is between four and five miles.

AT a recent meeting of the Dundee Town Council a discussion took place in reference to the question of the electric lighting of the public streets. Bailie Doig asked whether the convener of the Electric Lighting Committee was considering the extension of the electric lamps in Nethergate and Tay-street, in reply to which it was stated that the Committee had every disposition to extend both the public and private electric lamps. It was proposed that the Council instruct its engineer to prepare a comprehensive scheme for extending the electric lighting system in the public streets. Bailie Doig thought the Council was quite right in extending the system on those streets where it was aware it would not be interfered with by the tramways. Latterly it was agreed to remit the whole question to the Gas Committee for further consideration.

THE extension of the electric lighting throughout the town of Bulawayo is being continued, and it is the best proof of the local success and popularity of the new light. Mr. Meikle, the resident engineer at the electric light station for Willoughby's Consolidated—or rather the subsidiary Electric Lighting Company—reports that the light would soon be available in the suburbs. At present the house-lighting load is equivalent to about 1000 lamps, while the capacity of each of the alternate current dynamos is 1500. The two, however, would be capable, if the present system of street-lighting were abandoned, of dealing with four times the present house-lighting load, so that any extension of plant for house-lighting need not be contemplated for fully two years. Mr. Meikle is strongly in favour of the company adopting a separate system of street-lighting by means of arc lamps. Altogether the progress is very gratifying, and augurs well for the future.

THE Corporation of Glasgow will shortly be called upon to consider a gigantic scheme for supplying electric current within the whole municipal area. Mr. Chamen, the newly-appointed engineer, has submitted a report on the matter to the Electricity Works Sub-Committee of the Corporation, and that Committee has approved generally of the suggestions made. The report will next come before the Electricity Committee. The capital expenditure detailed in the report is £551,000, made up as follows :—Capital expenditure at present, £150,000 ; capital expenditure proposed in report, £396,000 ; cost of removal of Waterloo-street plant, £5000. The surest way to arrive at a low rate of charge for the supply of electric light is to make the concern as large as possible, so that the sooner the capital expenditure contemplated in the report is reached the better. Mr. Chamen therefore recommends (1) that, in addition to the £95,000 to which the Corporation already stand committed, a further expenditure of £61,000 be authorised for the Port Dundas station and mains, and (2) that an expenditure of £108,000 be authorised for the South Side station and mains.

THE adjourned meeting in connection with the proposal to introduce the electric light to Wormit was held in the Public Hall on Thursday, the 5th inst. The Chairman ruled that the meeting was called to discuss the proposal to establish electric light, and read Mr. Cowley's original circular. Mr. Balfour, of Edinburgh, made a statement which showed that the figures submitted to the last meeting were correct, and advised the meeting to start a company amongst the residents for the purpose of establishing an electric lighting station. Mr. Balfour explained that by doing so they would then be keeping the profits to themselves, and informed the meeting that there were many large companies ready to set up plant in such places as Wormit, which in the end would mean a heavy purchase price if the community at some future time wished to buy out the installation. He also said he was informed that a company could be formed in twenty-four hours, consisting of local gentlemen. In drawing comparisons of cost, he said that in Edinburgh the light cost 3½d. per unit, or equal to about 3s. 6d. per 1000 cubic feet of gas, and was 3 per cent. better light, while for motive power the price was 1½d. per unit. He estimated that 5d. per unit for Wormit would be ample, and that in course of time it would be much less. At the conclusion the following gentlemen were unanimously appointed to go on with the scheme :—Messrs. Anson Wood, Robert Kinnes, John Lawson, George Duncan, and William Cowley.

Law Cases.

DRAINAGE OF ISLINGTON.

IN the Court of Queen's Bench, before Mr. Justice WILLS and Mr. Justice KENNEDY, Mr. C. A. RUSSELL, Q.C., with whom was Mr. GWYNNE JAMES, applied *ex parte*, on behalf of the Midland Railway Company, the South-Eastern Railway Company, and the Tottenham and Hampstead Junction Railway Company, for a rule for a man-

damus directed to the Vestry of St. Mary's, Islington, requiring them forthwith to take such steps as might be necessary for the effectual drainage of their district. The learned counsel explained that a sewer vested in the Vestry ran right under a considerable portion of a line of railway belonging to the applicants. At the time that the sewer was constructed the district was practically a rural district. There were but few houses, and the sewer was then sufficient to carry off the surface water. Buildings and houses had now been erected, and the district had become an urban district, with the result that a much larger quantity of surface water than formerly found its way into this drain, arising in part from the fact that much less got away by percolation. The slope of the land was from north to south, and whenever there was a heavy rainfall the water that was unable to find its way down the drain flooded the line, and did very considerable damage. Since 1889 applications had from time to time been made to the Vestry to remedy this state of things, but up to the present time nothing had been done in the matter. He asked for a rule calling upon the Vestry to take all necessary steps to effectually drain their district, and to submit a scheme for the approval of the London County Council.

Mr. Justice WILLS said they thought that was the proper form for the rule to take, and granted the application accordingly.

ATTACK ON A LADY SANITARY INSPECTOR.

HUGH M'CARTY, labourer, 40, Blackie's-buildings, Regent-road, was summoned at the Liverpool Police-court for assaulting Miss Ethel Frances Burton, a Sanitary Inspector in the employ of the Liverpool Corporation, on the 26th ult. Mr. RUDD appeared for the complainant, and Mr. LOWNDES for the defendant. Complainant stated that her duties consisted of visiting premises and reporting insanitary conditions. She had been employed in this duty for over a year. On the 26th ult., at 10.30 a.m., in company with Miss Heald, another Inspector, she visited defendant's house. On knocking at the door she was admitted by defendant's wife. Witness was in uniform. The rooms occupied by defendant consisted of a kitchen and three bedrooms. Defendant's wife became violent, and appeared to be under the impression that witness wished in some way or other to interfere with the children. Without witness requesting her to do so, she took her into a bedroom. Defendant, who was lying on a sofa, got up and became very violent. He seized witness by the arm and dragged her into another bedroom, and ultimately snatched witness's book from her. Defendant's wife stood in the doorway, and prevented witness leaving the room for half an hour. Defendant eventually allowed witness and Miss Heald to leave the house. Miss Heald gave corroborative evidence. Complainant, in reply to the Bench, said they did not as a rule make surprise visits. Mr. Lowndes, in defence, said defendant was a man of good character, and was under some irritation at the time the ladies visited the house. Mr. Kinghorn said what he looked upon as the serious part of the case was that these ladies visited the house in their official capacity. He was sure ladies would perform duties of this kind with more delicacy than men could possibly do, and seeing they were ladies he was bound to take a serious view of the matter. He must impose what to defendant would be a serious penalty, namely, 20s. and costs.

A COSTLY CESSPOOL.

AT the Enfield Petty Sessions, Phillip J. Collins, of the Moat House, Southbury-road, Enfield, was summoned by the Enfield District Council for allowing a cesspool attached to his house to overflow on October 29th, 1897, and March 18th last. He was also summoned for £1 19s., expenses incurred by the Council in emptying the cesspool. Mr. Munro, Sanitary Inspector under the Council, said that after a request in writing, on October 15th last, he went to the Moat House and found the cesspool full and the sewage flowing back up the drain from the house. On October 29th the conditions were the same, and witness wrote to defendant, the cesspool being emptied by the Council's men the following day. On March 18th he again found the cesspool full, and it had to be emptied by the Council, the cost for both occasions being £1 19s. 6d. At Goat-lane, Wadley Wood, and some other districts, where asked, the Council undertook to clear out cesspools at certain fixed charges. The Council did not charge in the case of one cesspool because there was a temporary arrangement while the Local Government Board were considering a scheme of drainage.

In defence, Mr. Collins contended that he paid the same rates as other people, and that the cesspool was not overflowing, though he would not say that it was not above the inlet pipe. The cesspool was made under the order of the District Council, but his contention was it should not have been made, and he wrote to ask Mr. Munro why he did not stop him when he stopped Mr. Hardman. The Council, too, emptied cesspools free where they were about to have the drainage. He was now rated at over 6s. a week.

The Clerk said that was no answer.

Defendant added they, the Council, had emptied it eight times, and could not recover the cost before, because they were over time in claiming for it.

The Bench imposed a fine of 5s. and costs in each case; and the costs to which the District Council had been put, including £1 1s. towards counsel's fee, a total amount of £4 15s.

Correspondence.

We do not in any way hold ourselves responsible for opinions expressed by our correspondents.

AN AMERICAN PHYSICIAN ON PREMATURE BURIAL.

(*To the Editor of* THE SANITARY RECORD.)

SIR,—In a series of articles on the subject of "Premature Burial and How it may be Prevented" in the *Medical Press and Circular*, a reprint of which you notice in THE SANITARY RECORD, April 22nd, Dr. Walsh calls attention to "the rank harvest of literature that has sprung up around the subject," and does not hesitate to declare that "the whole theory of premature burial is unsupported

by a single scientifically-proved instance." Referring to this statement, Colonel Vollum, M.D., Inspector of Hospitals in the United States, and one of the authors of the volume before mentioned, writes that "Outside of Austria and Germany neither science nor the medical profession has ever given much attention to the subject. The disclosures of these disasters (live burial) have for the most part come to light by mere chance or accident. There is little room for scientific proof under such circumstances. Even in the countries before named (where the law requires two inspections of the body, independent of the attending physician, and where every possible precaution, aided by scientific methods, are employed to prevent these disasters) the experiences of these official expert inspectors are a sealed book to the public, consequently they throw no light upon what science has done in the matter under their hands. Yet we find that the systems of inspection of the dead, with that of waiting mortuaries, which have existed in those countries for nearly a century, are being extended and perfected at the present time. This is sufficient proof that they have been found necessary to prevent living burials, which the Mayor of Munich acknowledges have occurred in his city in spite of all these precautions for their prevention."

Not wishing to trespass unduly on your valuable space, I will, with your permission, revert to Colonel Vollum's further observations on another occasion. I may observe that the American physician's interest in the subject began through his own narrow escape, having been left for burial after medical examination.—Yours faithfully, M. A.

April 30th, 1898.

Notes and Queries.

[Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to The Editor, "Notes and Queries," The Sanitary Record, 5, Fetter-lane, London, E.C 1

Note.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

1071. — Smoke Nuisance from Pipe Manufacturer's Kilns.—"M." writes:—"We are manufacturers of sanitary pipes, our works being situated in the middle of a town, although formerly they were surrounded by fields. We have been served with a notice from the Local Authority to abate the smoke nuisance arising from our kilns within a specified time. Now, to do this means to close our works. We might possibly, by erecting shafts costing £300 or £400, reduce the nuisance from two kilns; but as these will probably have to come down within twelve or eighteen months, such an expenditure will be a waste of money. But we cannot entirely abate the nuisance except by closing the works altogether. Will you please say what powers are vested in the Local Authority to enforce the notices?"

Answer.—The Local Authority have doubtless served notice under Sec. 94 of the Public Health Act, 1875, in that a nuisance is deemed to be caused under Sub-sec. 7 of Sec. 91 of the Act. Under this sub-section "any fireplace or furnace which does not, as far as practicable, consume the smoke arising from the combustible used therein, and which is used for working engines by steam, or in any mill, factory, dye-house, brewery, bakehouse, or gasworks, or in any manufacturing or trade process whatsoever, shall be deemed to be a nuisance liable to be dealt with summarily in manner provided by the Act." There is an important proviso, however, to the section, which is as follows:—"Where a person is summoned before any Court in respect of a nuisance arising from a fireplace or furnace which does not consume the smoke arising from the combustible used in such fireplace or furnace, the Court shall hold that no nuisance is created within the meaning of this Act, and dismiss the complaint if it is satisfied that such fireplace or furnace is constructed in such manner as to consume as far as practicable, having regard to the manufacture or trade, all smoke arising therefrom, and that such fireplace or furnace has been carefully attended to by the person having the charge thereof."

1072.—Houses: Cleansing and Lime-washing: Powers as to.—"Scissors" writes:—"Is there any section under which I can proceed in regard to the cleansing of houses which the owners and occupiers have allowed to become very dirty, and in my opinion unfit to live in because of not being cleansed?"

Answer.—If the premises are in such a state as to be a nuisance or injurious to health, as defined by Sec. 91 of the Public Health Act, 1875, they may require the occupier, by notice under Sec. 94, to abate the nuisance by cleansing and lime-washing the house, if such be necessary. Or the Authority may require, under Sec. 120 of the Act, if the Medical Officer of Health certifies that the cleansing and disinfecting of any house would tend to prevent or check infectious disease, the owner or occupier to cleanse and disinfect such house.

1073. — Dairies, Cowsheds, and Milkshops Orders: Provisions as to Cleanliness, &c.—"E. W. P." writes:—"(1) What penalty (if any) is there if a dairyman or purveyor of milk does not register himself with the Local Authority? (2) If there are no regulations in the district as to dairies, &c., what power has the Sanitary Inspector for prescribing for the lighting, ventilation, drainage, and the keeping of dairies? (3) A purveyor of milk keeps the milk in churns in a front room of a small house; the room is used as a general shop. What power has the Sanitary Authority to require the dairyman to provide a proper milk-store?"

Answer.—(1) Article 6 of the Dairies, Cowsheds, and Milkshops Order of 1885 provides that it shall not be lawful for any person to carry on in the district of any Local Authority the trade of cowkeeper, dairyman, or purveyor of milk unless he is registered as such therein; and Article 3 of the Dairies, Cowsheds, and Milkshops Amending Order, 1886, prescribes a penalty of £5, and in the case of a continuing offence a penalty of £2 per day for an offence against the Order of 1885. (2) A cowkeeper or dairyman is required by Article 7 of the Order of 1885 to make provision to the reasonable satisfaction of the Local Authority for the lighting and ventilation, including air space, and the cleansing, drainage, and water supply of every cowshed or dairy not occupied as such prior to the commencement of the Order; and Article 8 makes similar provisions as regards dairies, &c, in use and occupation prior to the commencement of the Order. The Local Authority should proceed under the provisions of one or other of these articles. (3) Article 11 of the Order of 1885 provides that it shall not be lawful for any person following the trade of a dairyman, &c., to use a milkstore or milkshop in his occupation, or permit the same to be used, as a sleeping apartment, or for any purpose incompatible with the proper preservation of the cleanliness of the milk-store or milkshop, and of the milk vessels and milk therein, or in any manner likely to cause contamination of the milk therein. If the Sanitary Authority are satisfied that these provisions are not complied with, they

may, after giving the occupier reasonable notice, proceed for a recovery of the penalty provided by Article 3 of the Dairies, Cowsheds, and Milkshops Amending Order, 1886.

1074.—Rural District Councillor: Assistant Overseer Disqualified for.—"R. D. C." writes:—"Will you please inform me whether a paid Assistant Overseer in a small rural parish is disqualified from serving as a Rural District Councillor or Guardian, the said Assistant Overseer being appointed by the justices prior to Rural District Councils being formed, and his duties explicitly stated to be all the duties of an Overseer of the Poor, with the exception of the collection of the poor-rates?"

Answer.—By Sec. 46 of the Local Government Act, 1894, a person is disqualified for being elected or being a member or chairman of a Council of a parish or of a district other than a borough, or of a Board of Guardians, if he holds any paid office under the Parish Council or District Council, or Board of Guardians, as the case may be. And by Sub-section 5 of this section a person disqualified for being a guardian shall also be disqualified for being a Rural District Councillor. Inasmuch as the Assistant Overseer is, it appears, holding a paid office under a Board of Guardians, he is disqualified from being elected, and from acting as a Guardian or Rural District Councillor in the district from which he derives a salary from the Guardians.

1075.—Water Supply: Power of Local Authority to Enforce Requirements as to Quality of Water Pipes.—"Inspector" writes:—"Can you please inform me whether a Local Authority has power under any of the Waterworks Acts to enforce a certain quality of pipes and cisterns to be fitted to water-closets? The supply is constant, and the Local Authority is the water company. They have no private powers."

Answer.—The provisions of Sec. 48 of the Waterworks Clauses Act, 1847, and of Secs. 16 and 17 of the Waterworks Clauses Act, 1863, apply to the case. These provisions are incorporated with the Public Health Act, under Sec. 57 of that Act. Sec. 48 of the Act of 1847 requires that water pipes shall be of such a strength and of such material as shall be approved of by the undertakers; while Sec. 16 and 17 of the Act of 1863 prescribes that if any person wrongfully does, or causes, or permits to be done, anything in contravention of any of the provisions of the special Act, or wrongfully fails to do anything which, under any of these provisions, ought to be done *for the prevention of waste, misuse, undue consumption, or contamination of the water* of the undertakers, they may cut off any of the pipes by or through which water is supplied by them to him, and may cease to supply him with water so long as the cause of injury remains or is not remedied, &c. Although Secs. 16 and 17 of the Act just quoted relating to cisterns are not very specific as to the size and capacity of cisterns, we are of opinion that the provisions are sufficiently wide as to cover reasonable requirements of the Authority appertaining thereto, so as to prevent the undue consumption or waste of water.

1076.—Nuisances: Removal of: In Cases of Emergency.—"B. W." writes:—"Is there any power by which (1) a serious nuisance, injurious to health, such as a stopped drain, causing an accumulation of excreta to overflow the closet and premises, or (2) the existence near dwelling-houses of decomposing carcases of cattle, requiring prompt abatement, can be removed more quickly than by the usual notices by the Inspector of Nuisances and the Local Authority?"

Answer.—(1) We know of no provisions other than those contained in the Public Health Acts, whereby a nuisance from a stopped drain may be required to be remedied, and which can be enforced with more expedition than is possible by service of notice on the direction of the Sanitary Authority. An Inspector of Nuisances may, of course, send a form of intimation or preliminary notice to the person responsible for the nuisance in such cases, and upon the expiration of the time allowed in the preliminary notice, report the matter to the Sanitary Authority, and obtain their direction and authority to serve a statutory notice, with power to institute legal proceedings in the event of such notice not being complied with. (2) In urban districts the provisions of Sec. 49 of the Public Health Act, 1875, are applicable to such cases as decomposing carcases referred to, and the Inspector of Nuisances may give notice to the person to whom the same belongs, without directions from the Sanitary Authority, to remove the "offensive or noxious matter," &c., within twenty-four hours, failing which he may remove and dispose of same, and recover expenses from the owner of the matter removed.

1077. — Building Bye-laws: Erection of New Building.—"W. C. C." writes:—"Will you kindly inform me if anyone can put up a club-room in the front of my dwelling-houses, the road being only 15ft. wide?"

Answer.—This query is so extremely vague that we are quite unable to give an opinion which will be helpful to our correspondent. If he will furnish us with a block plan drawn to scale, showing the situation of the proposed club and his own dwelling-houses, and also inform us whether the district is an urban one or a rural one, and whether bye-laws as to new streets and buildings are in force in the district, we will then endeavour to assist him.

1078.—Offensive Drains and Water-closets inside Bakehouses.—"Bakehouse" writes:—"Thanks for your reply to my Query No. 1057 *re* above. Sec. 15 of the Factory and Workshop Act, 1883, says, 'It shall not be lawful to let or suffer to be occupied as a bakehouse or to occupy as a bakehouse any room or place which was not so let or occupied before the 1st day of June, 1883, unless the following regulations are complied with,' &c. I shall be glad if you will tell me what course I am to take to abate such nuisances in bakehouses let and occupied before the 1st day of June, 1883. Am I to serve notice under Sec. 91 of the Public Health Act, 1875?"

Answer.—On reference to the provisions of Sec. 15 of the Factory and Workshop Act, 1883, we find that the clause "which was not so let or occupied before the 1st day of June, 1883," was repealed by Sec. 27, Sub-sec. 2, of the Factory and Workshop Act, 1895, and the section must now be read:—"It shall not be lawful to let or suffer to be occupied as a bakehouse or to occupy as a bakehouse any room or place unless the following regulations are complied with," &c. The procedure as suggested by us in our reply to Query 1057 should therefore be followed.

Vacancies.

Assistant Borough Surveyor (Luton, May 14th).—For the Town Council. Salary £110 per annum. Mr. Geo. Sewell, town clerk, Luton.

Engineer (London, W.C., May 25th).—For the Metropolitan Asylums Board. Salary £600 per annum, with travelling expenses, office accommodation, and the necessary clerical assistance. Application forms may be obtained from Mr. T. Duncombe Mann, clerk, Chief Offices, Norfolk House, Norfolk-street, Strand, W.C.

Inspector of Nuisances (Bromley, May 14th).—For the Rural District Council. Salary £150 per annum, inclusive of all expenses. Application forms can be obtained at the Clerk's Office, 96, High-street, Bromley.

ASSISTANT SURVEYOR (BURNLEY, May 20th).—Salary £150 per annum. Town Clerk's Office.

BUILDING FOREMAN (WALTHAMSTOW, May 27th).—For the Urban District Council. Salary £3 10s. per week. Mr. E. J. Gowen, clerk, Town Hall, Walthamstow.

CITY ENGINEER (CAPE TOWN, June 15th).—For the Corporation of the City of Cape Town. Commencing salary £800 per annum. Messrs. Davis and Soper, 54, St. Mary-axe, London, E.C.

DEPUTY CITY SURVEYOR (CARLISLE, May 23rd).—For the Corporation. Salary £150 per annum, rising by annual increments of £10 to a maximum of £200 per annum. Mr. Henry C. Marks, A.M.I.C.E., city surveyor, 36, Fisher-street, Carlisle.

ELECTRICAL ENGINEER (LONDON, E., May 16th).—For the Electric Lighting Committee of the Poplar Board of Works. Mr. Leonard Potts, clerk, 117, High-street, Poplar.

ELECTRICAL ENGINEER (REDDITCH, May 14th).—For the Urban District Council. Messrs. Browning and Hobson, clerks to the Council, Redditch.

ENGINEER, &c. (HARTLEPOOL, May 24th).—For the Hartlepool Port and Harbour Commissioners. Salary £400 per annum. Mr. S. Herbert Belk, law clerk to the Commissioners, West Hartlepool.

Contracts Open.

The dates given below are the latest up to which tenders can be received.

BOSTON (LINCS.)—May 16th.—Roding, &c., Drains.—Mr. H. Clarke, C.E., Boston.

LLANTRISANT (WALES). — May 16th. — Drainage Work.—Mr. W. John, School Board Office, Llantrisant.

WARRINGTON.—May 16th. — Pipes. — Mr. Thomas Longdin, borough surveyor, Town Hall.

BLACKBURN.—May 17th. — Electric Lighting.—Mr. John McLellan, 50, Northgate, Blackburn.

ROCHDALE.—Electric Lighting.—Mr. R. A. Leach, clerk, Union Offices, Townhead, Rochdale.

BERKHAMSTEAD. —May 17th. — Sewer. — The Surveyor's Office, Shrublands-terrace, Berkhamstead.

LONDON, N.E.—May 19th.—Drain Pipes.—Mr. F. W. Barratt, surveyor to the Vestry, Vestry Hall, Churchrow, Bethnal Green.

SALE.—May 19th. — Sewering. — Chairman of the Building and Drainage Committee, 4, School-road, Sale.

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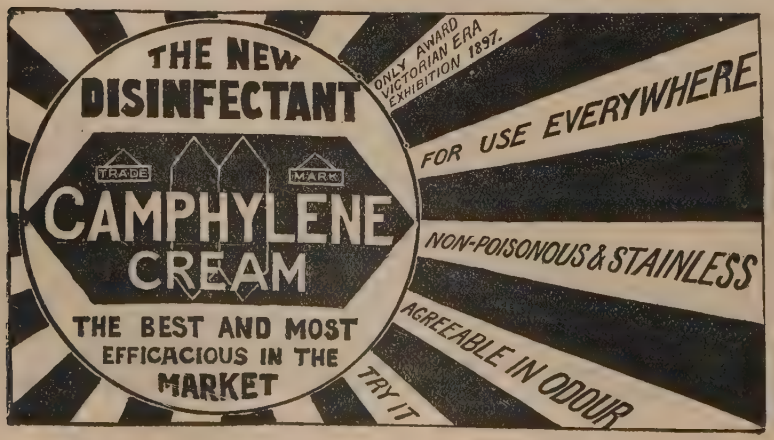

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Town Clerk's Office, Scarborough, Town Clerk.
May 2nd, 1898.

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HENRY J. SMITH,
Clerk to the Vestry.
Lambeth Vestry Hall, Kennington-green, S.E.,
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THE

Sanitary Record,

MAY 20, 1898.

Notes.

Crops for Sewage Farms.

IT is commonly urged against the British farmer that he is a lethargic, conservative being who makes little progress in the development of his particular industry, and that he is slow to profit by the advances of science as applied to agriculture. This is no doubt true in great measure, and probably the influence of heredity is some palliation for it. But what can be said in regard to the management of the majority of the sewage farms in this country in relation to the crops that are grown thereon? There is, it appears, an absolute want of resource, or shall we say intelligence, in the inability to grow crops other than those introduced with the earliest sewage farm, and a repetition which is almost inconceivable. We find almost without exception that the familiar Italian rye-grass is grown more or less on every farm. In some instances cabbages, turnips, mangolds, and a few cereals are cultivated, all of which are grown by the ordinary farmer, but it is rarely possible to find any departure from this groove. Considering that Local Authorities are not usually limited in pecuniary resources, and that they are not influenced by heredity or environments, we confess there is little justification for the paucity of knowledge manifested in the cultivation of varying crops on sewage farms. We know of no reason why Local Authorities should not endeavour to assist British agriculture, by introducing to the benefit of the British farmer new crops which he has not hitherto cultivated, but which may be grown with increased profit to the Local Authority over those of the routine type. Thus, peppermint may be cultivated on a large number of farms, and this has been shown to be already possible in the case of one farm of which we are aware, viz., Sutton, Surrey, and which yielded a profit of about £21 per acre last year. There is no reason why lavender plants, the oil of which is now at an extraordinary price, may not be similarly grown; while strawberries, if cultivated and sewaged on the lines suggested by Mr. Dibdin in his article on "The Proper Use of Land in Connection with Sewage Purification," in our issue of April 1st, may not be grown with safety, while fruit trees and other classes of trees, vegetables, and even flowers, which command a good price, should also be grown. It is often supposed, though erroneously, that crops are the purifiers of sewage. As a matter of fact, the purification is effected by the nitrifying organisms or bacteria in the soil, and that purification is equally well effected without the aid of crops at all. From a commercial point of view, however, it is necessary to utilise the land, and this should be done wherever practicable to its fullest extent compatible, of course, with the proper purification of the sewage. We trust the day is not far distant when a more intelligent interest is shown in the sewage farms of the country, and when they can be looked to by the ordinary farmer for lessons which he may learn to his own profit, and that of the landowner, and to the benefit of the community at large.

Dust Collection in Camberwell.

ONE of the many public services which the London County Council performs is that of keeping Local Authorities up to their work. In some cases this is sorely needed, because the prevailing motive among local administrators is often that of undue economy, which means either inadequate or inefficient service. As far back as 1895 the Council has been pressing Camberwell to improve its system of collection of house refuse. The Vestry promised amendment, but further inquiries recently show that dust is still allowed to accumulate, and that there is other evidence of neglect. The Council's bye-laws require each Sanitary Authority to remove dust and house refuse not less frequently than once a week, and Section 30 of the Public Health (London) Act also steps in to the aid of sanitation in this respect. The result is that the Public Health Committee of the Council are recommending that proceedings be taken against the Camberwell Vestry, but before this can be done the sanction of the Local Government Board has to be obtained, though in view of the alleged serious position of affairs, there is not much doubt that this will be forthcoming.

Sanitary Inspectors as Witnesses.

CAMBERWELL appears to be in the black books of the Council in other respects, for the Public Health Committee is also submitting an important report which may have consequences of a grave nature so far as Sanitary Inspectors are concerned. Some time ago the Council took proceedings against the Westbury Dairy Company, Sumner-road, Peckham, for exposing milk to risk of contamination, which is an offence against the Council's regulations. Two Sanitary Inspectors in the employ of the Camberwell Vestry were called for the defence, and gave evidence against the Council's contention. Dr. Hamer's report, as Assistant Medical Officer of the Council, has been submitted by the Committee to show that the action of the Sanitary Inspectors was questionable, and now they desire to call the attention, not only of the Vestry, but also the Local Government Board, to the facts of the case. Whatever may be the result, there is clearly a need for determining the principle which should govern the giving of evidence in prosecutions of this kind by public officials, no matter what may be their position in the service.

Overcrowding in the East End.

THE question of overcrowding among the foreign population of the East End of London is occupying the attention of the Local Sanitary Authorities somewhat closely just now, particularly in St. George's East, and Whitechapel, which districts are the dumping-ground for alien immigrants. There is some reason for believing that the evil has been exaggerated, but without doubt there are certain streets and houses where overcrowding exists to an alarming extent at night time, when tenement houses can be found crowded to the very passages. The evil is peculiarly difficult to master, because unless a house is registered entry cannot be made between certain hours without a magistrate's order, and this order cannot be obtained without very definite sworn information. The registration of houses let in lodgings has had a good effect in keeping down any tendency to overcrowd—a tendency quite natural in areas where the rents are always rising. If districts such as those mentioned are not to become standing menaces to the health of the community, the Local Sanitary Authorities will have to be armed with greater powers than they now possess to prevent the inordinate congestion of a poor foreign population.

The Vaccination Bill.

THERE can be little doubt as to the attitude of the House of Commons towards the Vaccination Bill, after the division on the second reading. The majority for the Bill was simply overwhelming, 237 voting for the second reading, and only twenty-three against, showing a majority of 214 in favour of the measure. That is to say, that is the proportion of the House of Commons which is resolved on maintaining and enforcing the general vaccination law; though it must not be supposed that all those who voted for the second reading approve of the Bill in its entirety, in its present shape. But the broad fact for us to consider is, that, in spite of the determined opposition which the anti-vaccinationists offered to the Bill—and they certainly made the most of their opportunity, and took their full share in the debate—when they came to the division lobby they could only muster up an insignificant twenty-three who were opposed to the root principles of our vaccination law. In truth, as Mr. T. W. Russell said, after the reports of the Select Committee of the House and of the Royal Commission, the question whether there should be vaccination or not has practically ceased to exist.

Leicester's Claim for "Liberty."

LEICESTER has certainly achieved the distinction of coming pretty well to the front in this controversy. It poses, on the one hand, as the champion of liberty; but in Parliament, on the other hand, it is pilloried as the stiff-necked borough that attempts to set up its little will against the will of the nation. Mr. T. W. Russell put the matter in a nutshell when he said that Leicester had no right to set aside the decision of Parliament; and another speaker stigmatised the right of "liberty" claimed by Leicester as nothing less than the liberty of Leicester to spread pestilence throughout the land. Perhaps the town is proud of the distinction, but we may hope that with the inauguration of a new policy a healthier feeling will set in. And the policy of the Government is quite clear. They hold that the new lymph has removed all objections to vaccination on account of the danger, and therefore they are firm that the law must be enforced. The new Bill will not really enlarge the law, but it will enable the Local Government Board to see that the law is carried out. In taking this line, they now have the satisfaction of knowing that they have at their back, not merely the most enlightened scientific opinion, but also the unhesitating mandate of the House of Commons.

"A Century of Vaccination."

As if to indicate that the anti-vaccination party is still full of life and vigour, we have almost contemporaneously with the second reading of the Vaccination Bill the publication of a book bearing the above title, reviewing the past history of the controversy. The author, Dr. Tebb, certainly puts his case very ably and skilfully, and makes the most of the various arguments against vaccination. For example, he compares the death-rate from small-pox since the introduction of vaccination with that which preceded Jenner's reform, and he draws the inference that the decrease is very much less than we should have expected, considering all that has been claimed for vaccination. Again, he compares the decrease in small-pox with that in typhus and typhoid, and he argues that the decrease in the case of small-pox, in spite of vaccination, is not nearly so marked as in the case of other infectious diseases. But it would not be difficult to show the fallacy underlying some of these arguments. Nothing is more misleading than statistics when placed in certain lights; so much depends on the periods selected, and many other conditions, that it is possible to marshal figures that lead to the most opposite results.

The Plague in India.

It is gratifying to observe a very marked decrease in the mortality from the plague in Bombay. The number of deaths during the past week was only 138, as compared with 263 in the preceding week. The death-rate from all causes was 44·04 per 1000, as compared with 53·66 in the last return. These figures are encouraging, and if the mortality maintains the same ratio of decrease, we should before long be able to record the end of the pestilence. But, in the meantime, it is unsafe to prophesy. It is very satisfactory, however, to hear that Professor Haffkine's treatment of plague patients is being attended with the most excellent results. The mortality under his system of inoculation is said to have been reduced by 90 per cent., and it would be strange if such a successful illustration of the powers of modern science in combating disease were unable to impress the native mind. We observe that a case of plague, or suspected to be the plague, has occurred at Suez; but it appears to be a solitary case, and as the patient is recovering, and all prophylactic measures have been taken to prevent the spread of the disease, there is little occasion for alarm.

Phosphorus Poisoning in Match-making.

The attention of the Home Secretary has been drawn to a case of phosphorus poisoning in Bryant and May's well-known match-making factory, which appears to indicate a grave neglect of duty on the part of the proprietors. If it had stood alone, it would not have called for much comment; but Sir Mathew White Ridley states that the inquiries which have been made reveal systematic neglect on the part of the firm to comply with the obligations incumbent on them to report cases of phosphorus poisoning. The case to which we have referred is considered by the Home-office so serious as to justify a prosecution of the firm. The industry of match-making is attended with peculiar dangers, and, that being so, the first care of the employers should be the health and safety of their workpeople. It is a matter for regret that a firm of the standing of Bryant and May should be judged wanting in this prime duty.

Corporal Punishment in Prisons Bill.

The discussions in the Grand Committee on Law of the House of Commons on the question of corporal punishment under the Bill promoted by the Home-office for the reform of prison administration, resulted, as we anticipated, in the adoption of a modified clause, under which such punishment is to be limited to cases of mutiny, grave personal violence, and the like. Some members of the Committee, including several of the Irish members, made a strenuous effort to secure the total abolition of corporal punishment, maintaining that the present opportunity of making this reform was one that should not be lost, as such an opportunity was not likely to recur for many years; but the Home Secretary could not see his way to adopt this course. He promised, however, to consider the feasibility of holding some kind of judicial proceedings before the ordering of corporal punishment.

The Prison Dietary.

Several members of the Committee, with the view of informing themselves at first hand as to the actual state of our prison administration, have under the authority of the Home Secretary visited a good many prisons, and have inquired for themselves into the questions of dietary and prison labour. It is understood that the result of their investigations has impressed many of them, including several supporters of the Government, with the conviction that the present system is unnecessarily harsh and severe in many respects, and especially in relation to prison labour and prison diet; and it is probable that their views will have considerable influence in inducing the Government to make some considerable concessions. Indeed, Sir Mathew White Ridley has already given an undertaking to reconsider the question of the dietary.

The Liquefaction of Hydrogen and Helium.

The scientific world was thrown into a great state of excitement last week by the announcement that Professor Dewar, of the Royal Institution, had at last succeeded in liquefying hydrogen and helium. The event is regarded as one of the very highest scientific importance. Many attempts have previously been made to liquefy hydrogen, but hitherto without success, the great difficulty being the extraordinary degree of cold that is necessary for the operation. It is difficult for the untrained mind to conceive the temperature at which hydrogen liquefies. It is not very far above that of space, or minus 273 deg. Cent. It is stated that it is the lowest temperature yet observed. To produce such a temperature very elaborate apparatus is requisite. In no place on the face of the globe is there to be found so low a temperature as in a vat in the laboratory of the Royal Institution. What the scientific results of Professor Dewar's discovery will be it would be hard to predict, but it will undoubtedly prove of enormous importance in placing a new and potent instrument in the hands of scientists which they have hitherto found lacking. All Englishmen will rejoice that the demonstration that all gases can now be liquefied adds another to the long roll of illustrious discoveries which already stand to the credit of British science.

The Rights of Private Acts.

It is no small matter for the public official to make himself thoroughly acquainted with all the public Acts of Parliament which govern the carrying out of his duties. So many overlap that much investigation has often to be made before one can really make sure of the right course to be adopted. But a far greater bother to him is the private Acts possessed by numerous companies by which they claim the right to do many things not within the privilege of the ordinary individual. A case in point has just occurred at Hampton. In carrying out some extensions of its works, the Grand Junction Water Company erected an engine-house which projected some distance beyond the building line. The Local Authority, acting under the Public Health (Building in Streets) Act, 1888, called upon the company to conform to the recognised boundary,

but this it declined to do, maintaining that the company's private Act could not be over-ridden by the one cited. Naturally the case went into Court, the counsel for the Water Company claiming that the building was necessary, and could not be put elsewhere. The company had power to erect buildings within certain limits, and, providing these were not exceeded, they claimed to be within their rights. In the evidence it was proved that even if the building was necessary, by the removal of a cottage it could have been erected just as well in a line with the houses, and this view was adopted by the magistrate. Ultimately a penalty of 1s. per day for each day the encroachment continued was inflicted, with 15 guineas costs. A case is to be stated for a higher Court.

Overcrowding in the Suburbs.

The rapid growth of some of the outlying parts of the metropolis becomes more apparent every day. If we go to the great "offshoots" on the borders of Essex and Middlesex, we find whole streets of houses being built with almost alarming rapidity. On the Surrey side of the Thames the growth is equally apparent, and what but a few years ago were green fields we now find covered with buildings. When all this expansion was first planned, we were told that by this means the wage-earning class of the community would be able to secure a house for each family at reasonable rents, and that cases of overcrowded dwellings would soon be confined to limited areas in the metropolis. But these prophecies have hardly been fulfilled. Instead of obtaining a "cheap" house, the workman finds the rents of the suburbs or outer villages are gradually becoming equal to those prevalent in London; and as a result houses intended for one family are made to accommodate two. As an outcome slums are growing up, and cases of overcrowding are frequent. No wonder we hear of an increased demand being made upon Local Authorities to adopt the Housing of the Working Classes Act, for it is only by such means that an end can be put to the constant raising of rents.

A County Laboratory for Surrey.

It is right that County Councils should bestir themselves in providing opportunities for the chemical examination of the water of the districts under their jurisdiction, as well as testing the effluents discharged into the streams and rivers. At the meeting of the Surrey County Council last week it was resolved to ask the Sanitary Committee "to consider and report as to the advisability of fitting up a laboratory at the County Hall, and the appointment of a chemist to make analyses of water, sewage effluents, or such other chemical investigations as the Council may from time to time direct." If this is carried out, great service will be rendered to the numerous Urban and Rural Councils within the county. For a nominal sum they should be able to obtain trustworthy evidence as to the condition of their water supply; and if in addition the county officials make independent examinations, there will be but little chance of such epidemics as that of Maidstone visiting the district. It would be well if every County Council in the kingdom followed the example thus set by one of the metropolitan counties. The secret of the advanced scientific practice in the United States is found in the continual investigations carried out at the various experimental stations.

Paris and its Water Supply.

An interesting variation has been made in the witnesses giving evidence before the Water Commission. At the last sitting, M. Gaston Cadoux, Chef de Bureau à la Prefecture de la Seine, and holder of other important offices, gave evidence. He told how in 1860 the municipality purchased the Paris Water Company's works for 58,000,000 f. From time to time they had added to the sources of supply at considerable cost. Paris was now almost wholly supplied with spring water, except in seasons of drought, when it was necessary to supply from the Seine also. Notice was given of the change through the newspapers and the placards. The water from the Seine was kept separate from the spring water, and it was found that the latter was more economical. The receipts did not meet all the expenditure, the balance being paid by the general revenue of the city of Paris. The municipality refused to raise the price, preferring indirect rather than direct payment. £1,500,000 of English money had been spent in providing for increased supply of better water. Save for this if the old charges had been maintained there would have been a profit. We understand that similar testimony as to the practice in other foreign cities will be given before the Commission.

Extras.

Local Authorities, and engineers also, will do well to take special note of the remarks of Major-General H. D. Crozier, at the recent Local Government Board inquiry at Hampton. There is nothing so unsatisfactory as running up a long string of "extras" in connection with any work, and the discussion of them always leads to strong feeling either in private concerns or public bodies. Of recent years the tendency has been for this item to increase, particularly in connection with sewerage schemes. Generally the excuse put forward is that "unforeseen difficulties" have arisen. But there is always the chance of this taking place, and we agree with General Crozier that a more liberal allowance should be made for contingencies. Engineers must realise that they are held responsible for these discrepancies between estimate and cost, and for their own reputation they should make the fullest investigation of a district before finally fixing their levels and quantities. For instance, we know a case at the present time, where in the original plans the laying of certain pipes was fixed in the drawing at about 9ft. below the ground, in the actual work they have had to be put at nearly 30ft. Many other expenses have arisen not provided in the estimate, but which cannot possibly be defended as "unforeseen." The orginal estimate of the scheme was £21,000 odd. If the district comes out with an expenditure of £30,000 it will be lucky. It is only for the Local Government Board to let it be known it will not sanction these "extras," and more careful estimates will be forthcoming.

LIME, MORTAR, AND CEMENT: THEIR COMPOSITION AND ANALYSES.

By W. J. DIBDIN, F.I.C., F.C.S., &c.

CHAPTER III.

THE SETTING OF MORTARS AND CEMENTS.

As already shown in the previous chapters, mortar is essentially a mixture of hydrate of lime with three to four times its weight of sand, and according to the text-books its hardening is chiefly due to the gradual conversion of the lime into carbonate by absorption of carbonic acid, known strictly as carbon dioxide (CO_2), from the atmosphere. This absorption is at first rapid, and then gradually slower. Mortars even centuries old still contain appreciable quantities of hydrate of lime. The hardening may be in some cases partially due to the formation of silicate of calcium, but the evidence of this is not very strong.

It is generally held that pure silica in the form of sand acts merely mechanically, and enters into no chemical combination with the lime. For all practical purposes this is true, but experiments have shown that in the course of several years some such action does take place to a very slight degree. In Petzholt's experiments, described by General Gilmore, he found:—

(1) That in mortar one hundred years old there was more soluble silica than in the original lime.

(2) That in mortar three hundred years old there was three times as much soluble silica as in mortar one hundred years old.

While these results may be accepted they yet leave the question open, as the slight action which had taken place was too small to throw any light on the process of hardening within the period of "setting." The degree to which lime is carbonated is also so slight within reasonable limits of time as not to warrant the assumption that the hardening properties are due to this action. Doubtless the re-arrangement of the molecules in what may be termed the initial stage of crystallisation, plays an important part, and from the fact that crystals of carbonate of lime adhere most firmly to the sand, and will stand a considerable degree of force before they can be released, it would appear that this mechanical action forms one of the most important facts in the problem.

It is well known that when lime is thrown out of solution by the process of softening water, introduced by the late Dr. Clark, the precipitated lime is generally in a crystalline form, and it is not unreasonable to assume that some such action takes place when mortar sets, the minute crystals formed adhering more or less firmly to the grains of sand according to the conditions prevailing at the moment. This action would go far to explain the cause of the non-setting of mortar made with bad or imperfectly burnt lime, old mortar, &c. If the crystallisation of the lime takes place upon the surface of a substance which in itself is friable, the resulting mass will have a power of cohesion greater than that possessed by the same substance in proportion only to the power of the lime; just as the strength of a brick wall cannot practically be greater than the strength of the bricks used, as, however hard the cement, the bricks will give way under a strain in excess of the power of cohesion of their integral parts. Hence the absolute necessity for the "grit" of mortar to be clean, free from earthy matter, and of an unfriable nature.

This crystallisation theory also explains the reason why so many different substances may be used in making good mortar—a fact which the theory of chemical combination of the component elements is altogether unable to reduce to order.

Another point is, that the modern practice of grinding all the materials for making mortar together in a mill leads to a most unsatisfactory condition of the "grit." The crystallisation theory presupposes the presence of a hard and firmly resisting number of particles cemented together by the crystallisation of the lime, whether as carbonate, hydrate, &c. If by grinding the grit to a powder these "main supports," as the particles of solid matter may be termed, of the structure are broken down to a mere dust, then the initial power of resistance to pressure which they exerted in their unground state, will be thrown away, and a useless as well as dangerous muddy mass be obtained in their place.

The character of the sand employed has also much to do with the result. I made an experiment some years back in conjunction with the late Mr. John Grant, whose work on cements is so well known and justly appreciated, in which two portions of a sample of good Portland cement was made up into briquettes with a given sample of sand. In the first the sand was in its normal state, but in the second experiment I heated the sand to redness, so as to completely oxidise the iron contained in it. The result was that the breaking strain of the briquette made with the heated sand was found to be nearly double that made with the unheated sand. Possibly, the greater combining power may have been due in some respects to an altered condition of the face of the particles of sand, in consequence of which the lime crystals adhered more firmly, and thus resisted the strain to a greater extent.

In consequence of pressure of other work the experiments were not continued, but it may be that they would form the starting point of a series which might result in valuable information being obtained.

Now that means of obtaining excessive pressures are more readily accessible than formerly it might be of value to undertake a series of experiments in which the briquettes made of various limes, cements, and sands, should be subjected to pressure of various degrees, and for various periods, and their breaking strain ascertained. Such a work might well be undertaken by a Committee of experts having the proper facilities at their disposal, as it is obvious the resources of a busy private laboratory are insufficient for the purpose.

The recent experiments on the breaking strain of brick piers made with various cements, &c., by the Institute of British Architects might very well be extended in this direction. In the course of a series of experiments undertaken by a Committee of that body, a number of piers constructed of various descriptions of bricks and cements were kept for various periods, and then subjected to heavy pressures, and the results have been published in the form of two valuable reports, a review of which will be submitted later on.

Mr. Grant, in his book, page 170, remarks, in

reference to the strength of cements, "that the cohesive varied directly as the adhesive strength of cement; that, in fact, neat cement was from three to four times the adhesive strength of any mixture of it with four or five times its bulk of sand; and on this account he was prepared to state in general terms, that cohesive and adhesive strength might be taken as equivalent to each other. For the purpose of cementing together various materials, he need hardly point out that to have strong cement or mortar was not the only thing necessary. For instance, two cubes of glass could not be cemented together, however strong the cement, so that they should adhere with the same tenacity as two bricks or blocks of stone of a porous character and rough on their faces. It would not be possible, for example, to take such bricks as were recently used for lining the subway from the Houses of Parliament to the adjoining railway station, and to cement their highly glazed china faces together so that it would require the same pull to separate them as it would to separate two stocks, wire-cut gault, Fareham red, or other porous bricks, capable of absorbing one-fifth of their weight of water. Whilst on this point, he might state that only second in importance (if second) to the strength of the cement was that of seeing that the bricks or stone to be cemented together were thoroughly saturated with water. In hot climates, like that of India, any work being built with cement should be kept wet and, if possible, under shelter during its progress, and for some time afterwards. Two bricks might be put together dry, as they came from the kiln, with the strongest cement that could be made, and if not previously soaked in water these bricks might be separated without the least difficulty, the joint being very little better than if made of dry sand. With bricks which absorbed from 1 lb. to 1¼ lb. of water it was evident that, if left to absorb this moisture from the mortar with which they were cemented, they took away that which was necessary for crystallising or setting the cement."

Mr. Grant found that "The washing of the sand seems to add about 35 per cent. to the strength at the end of a week; but at the end of a month this experiment is not so satisfactory. If not washed, pit sand in the proportion of 1 of cement to 2 of sand, the breaking weight, at twenty-eight days was 330 lb., or 46·2 per cent. above the first specimen of Thames sand, or 31·21 per cent. above the same sand when not washed.

As indicating the position of the question of the setting of cements, as brought out by the results of his very numerous experiments, Mr. Grant summed them up in the following recapitulation of the results of the tests.[1]

(1) The earlier experiments, made six years ago (1859), gave, at the end of a month, a breaking weight varying from 75 lb. to 719 lb. on an area of 2¼ square inches.

(2) A minimum test of, at first, 400 lb., and afterwards of 500 lb., was specified.

(3) During six years the average strength of 1,369,210 bushels used in the Southern Main Drainage Works has been 606·8 lb., being 52 per cent. above the standard first specified, and 21 per cent. above that subsequently adopted.

1. "The Strength of Cements. J. Grant. Page 14.

(4) The average weight per bushel has been 114·15 lb., being 4·15 per cent. above the specified standard.

(5) Portland cement has been proved to be peculiarly suitable for hydraulic works, and may be procured in any quantity and of the highest quality.

(6) Portland cement, if it be preserved from moisture, does not, like Roman cement, lose its strength by being kept in casks or sacks, but rather improves by age; a great advantage in the case of cement which has to be exported.

(7) The longer it is in setting the more its strength increases.

(8) Neat cement is stronger than any admixture of it with sand.

(9) Cement mixed with an equal quantity of sand (as has been the case throughout the Southern Main Drainage Works) may be said to be, at the end of a year, approximately three-fourths of the strength of neat cement.

(10) Mixed with two parts of sand it is half the strength of neat cement.

(11) With three parts of sand the strength is a third of neat cement.

(12) With four parts of sand the strength is a fourth of neat cement.

(13) With five parts of sand the strength is about a sixth of neat cement.

(14) The cleaner and sharper the sand, the greater the strength.

(15) Very strong Portland cement is heavy, of a bluish-grey colour, and sets slowly. Quick-setting cement has generally too large a proportion of clay in its composition, is brownish in colour, and turns out weak, if not useless.

(16) The stiffer the cement mortar, that is, the less the amount of water used in working it up, the better.

(17) It is of the greatest importance that the bricks or stone with which Portland cement is used should be thoroughly soaked with water. If under water in a quiescent state, the cement will be stronger than out of water. Table XIX. shows that cement kept in water was one-third stronger than that kept out.

(18) Blocks of brickwork or concrete made with Portland cement, if kept under water till required for use, would be much stronger than if kept dry.

(19) Salt water is as safe for mixing with Portland cement as fresh water.

(20) Bricks made with neat Portland cement are as strong at from six months to nine months as the best quality of Staffordshire blue bricks, or similar blocks of Bramley Fall stone, or Yorkshire landings.

(21) Bricks made of 4 parts or 5 parts of sand to 1 part of Portland cement will bear a pressure equal to the best picked stocks.

(22) Portland cement concrete, made in the proportions of 1 of cement to 8 of ballast, in some cases, and of 1 to 6 in others, has been extensively used for the foundations of the river wall, piers of reservoirs, and foundations generally, at Crossness and Deptford, with the most perfect success, and it is believed that it might be much more extensively used as a substitute for brickwork or masonry wherever skilled labour, stone, or bricks are scarce, and foundations are wanted at the least expenditure of time or money.

(23) Wherever concrete is used under water,

care must be taken that the water is still; as otherwise a current, whether natural or caused by pumping, will carry away the cement and leave only the clean ballast.

(24) Roman cement, though about two-thirds the cost of Portland, is only about one-third its strength, and is therefore double the cost, measured by strength.

(25) Roman cement is very ill-adapted for mixing with sand.

In conclusion, Mr. Grant, whilst recommending Portland cement as the best article of its kind that can be used by the engineer or the architect, warned anyone against its use who is not prepared to take the trouble or incur the trifling expense of testing it, as if manufactured with improper proportions of its constituents—chalk and clay—or improperly burnt, it may do more mischief than the poorest lime.

The suggestion that the adhesive powers of mortar and cement are due to a process of crystallisation in contact with a roughened surface is strongly supported by the results of Mr. Grant's experience, as he lays the greatest stress upon the necessity for the presence of an ample supply of still water. The experience with the dry brick is most striking, as it is clear that such a brick would instantly absorb the moisture in the cement immediately in contact with it, and thus deprive it of the moisture necessary to bring about the process of crystallisation.

THE CHEMICAL AND BIOLOGICAL ANALYSIS OF WATER.

By T. H. Pearmain and C. G. Moor, M.A. (Cantab).

Members of the Society of Public Analysts. Authors of "Applied Bacteriology;" "The Analysis of Food and Drugs," &c.

(*Continued from page* 505.)

SURFACE WATER.

As already mentioned, the whole of our potable water is derived originally from the atmosphere in the form of rain. Part of this sinks into the earth, and the remainder runs over the surface of the land in the form of streamlets which unite to form rivers, ponds, lakes, &c. The water as it flows over the surface takes up more or less suspended and dissolved matters, the former being found in larger amounts when the rainfall is plentiful. The wearing action of water is largely dependent on the nature of the suspended matter that it conveys down from the upper levels of the watershed. When the tributaries conveying the waters from districts of varying characters become mixed, the nature of the suspended and dissolved matters may become largely modified. When the streams from the higher levels of a watershed, more or less in the form of rapid mountain torrents, gather together to form rivers, the rapidity of the current naturally becomes slower as they reach the lower levels, and as a result much of the suspended matter is deposited. The water of streams and lakes is in part derived from springs, which in many cases come from great depths, and thus may introduce into solution substances which are not present in surface water proper.

By the joint action of air and water the hardest rocks undergo a weathering or disintegrating process. By the exposure of the surface of the rocks to the alternate freezing and thawing of the water contained in the minute interstices, the superficial layers become broken down, thus enabling the water to exercise a solvent action upon the soluble constituents, the insoluble portion being conveyed down to the lower levels in the form of gravel and mud.

The Igneous, Metamorphic, Silurian, Cambrian, and Devonian rocks, which are so largely exposed in the western parts of England and Wales, yield a very considerable amount of surface water. The water so yielded is generally exceedingly soft and of high organic purity.

Rivers are very liable to pollution, as they form the natural destination for the drainage from the land situated on each bank. From the earliest times inland towns have always, when possible, been established upon the banks of a river or stream, in order to be within easy reach of an abundant supply of drinking water, and for the convenience of commerce. As the populations increased the amount of water used and fouled became greater and greater, owing to the soil becoming saturated with excremental matter due to the earth method of disposal which was in vogue for so many years.

SUBSOIL WATER OR GROUND WATER.

Subsoil water is that which has percolated the strata immediately below the soil, and is generally easily obtained by means of shallow wells. Subsoil water is one of the most frequent sources of supply, particularly in villages, but it is exceedingly liable to pollution, especially in the vicinity of houses, farms, &c. The amount of water which enters the soil depends upon the permeability, and varies with the nature of the strata, gravel soils being the most and clayey soils the least permeable. The quality of subsoil water also varies with the nature of the subsoil and the proximity to houses. Subsoil water from the chalk, lias, oolite, and limestone districts will be hard, but that supplied from the older formations, such as the Yoredale and millstone grits, as also that from sands and gravels generally, will be soft if uncontaminated. Water collected by means of shallow wells in the proximity to human habitations is often most dangerous to health, owing to its receiving the leakage and soakage from privies, drains, and cesspools, although, notwithstanding the presence of these dangerous polluting matters, it is normally bright and palatable.

DEEP OR ARTESIAN WELL WATER.

Deep borings, or artesian wells, particularly those which pass through impervious into pervious water-bearing strata, are very important sources of water from the hygienic point of view, since many of these wells provide practically unlimited amounts of water of almost absolute organic purity. The geological conditions do not always, however, favour this type of well. The older rocks, such as the Devonian, millstone grit, magnesian limestone, and coal measures provide but little water by this means. The new red sandstone, oolites, chalk, lias, and greensands are the great water-bearing strata. These formations contain vast volumes of water stored up in their pores and fissures, and are

capable of providing practically unlimited supplies of drinking water of the highest purity, and it is a matter of surprise that greater use is not made of this source of supply. The Rivers Pollution Commissioners found the deep well waters from the chalk "almost invariably colourless, palatable, and brilliantly clear. The chalk formation constitutes magnificent underground reservoirs, in which vast volumes of water are not only rendered and kept pure, but stored and preserved at a uniform temperature of about 10 deg. Cent., so as to be cool and refreshing in summer, and far removed from the freezing point in winter."

SEA WATER.

Sea water is but of little importance from the hygienic point, but is of great interest chemically. Sea water taken from the surface of the ocean, ranges in specific gravity from 1022·0 to 1029·0, pure water being 1000·0, and contains from 3·3 to 3·9 per cent. of dissolved solids. The water of narrow seas may contain less than this, thus the Baltic only contains 1·8 per cent. of solids. The water of inland seas or lakes may, however, be heavily loaded with dissolved solids; for instance, the Dead Sea contains 24·0 per cent. of solids.

The solids of sea water consist in the main of common salt (sodium chloride). According to Dittmar, the solids of sea water on the average have the following composition:—

Chloride of sodium	77·7	per cent.
Chloride of magnesium ...	10·9	,, ,,
Sulphate of magnesium ...	4·7	,, ,,
Sulphate of calcium... ...	3·6	,, ,,
Sulphate of potassium ...	2·5	,, ,,
Bromide of magnesium ...	0·2	,, ,,
Carbonate of calcium ...	0·3	,, ,,

(*To be continued.*)

NOTES ON
PRACTICAL SANITARY SCIENCE.

By WILLIAM H. MAXWELL.

Assistant Engineer and Surveyor, Leyton Urban District Council Author of "Drainage Work and Sanitary Fittings," "Ventilation Heating, and Lighting," &c., Certificates of the Association of Municipal and County Engineers, and Sanitary Institute.

(*Continued from page* 503.)

GENERAL OBSERVATIONS ON REFUSE DESTRUCTORS.

Duty per Cell.—The quantity of house refuse destroyed per cell per day varies from 3½ tons up to 10 tons, and in the Beaman and Deas' furnace from 20 to 24 tons per cell per day. Much depends, however, upon the care or the reverse in stoking, upon the class of material, and the frequency of removal of clinker; also upon the question as to whether the whole of the refuse passed into the furnace is thoroughly cremated.

Great attention is now being directed to the utilisation of the surplus heat derived from the combustion of refuse, and in many towns, such, for example, as Cambridge, Shoreditch, and Hereford, the main object aimed at is not the riddance of the largest quantity of refuse possible per cell, but the full utilisation of all the heat available from this class of fuel—provided the material is properly burnt and without trace of nuisance.

Amount of Residuum, and its Uses.—The amount of residuum, in the shape of clinker and fine ash, varies from 22 to 37 per cent. of the bulk dealt with. About 25 per cent. is a very usual amount.

The clinker is found to be useful for mortar making, is ground with lime in a pug mill, and, in some towns where there is a demand, is sold at a profit. It has also been applied to the manufacture of paving slabs, &c., and is a very useful material for bottoming roads carrying a light traffic. Where there is no demand, and where the above uses do not arise, it is found to be expensive and difficult to dispose of

At the Battersea destructor depôt, during the year from 25th March, 1896, to 25th March, 1897, it appears that 2060 tons of clinker were carted away by contractor, 1989 tons given away at the works, and 1653 tons were used by the Vestry. A considerable amount of the residue is utilised in the manufacture of tar and concrete paving, a large quantity of which has been used in paving the footpaths of new streets and other paths in the parish, or sold to contractors and adjoining parishes. During the same year the removal of old tins and fine ash entailed an expenditure of £127 2s. 4d., whilst the cash received for clinker was £24 3s. 1d.

Of the total residue arising from the working of an ordinary refuse destructor it is found 8 per cent. to 9 per cent. consists of "*fine ash*," and 17 per cent. to 18 per cent. of "*clinker*." These amounts vary somewhat in almost every town, and depend upon:—

(*a*) The habits of the people, and the method and frequency of dust collection.
(*b*) The time of the year, and the state of the weather.
(*c*) The quantity of "trade refuse" dealt with.
(*d*) The locality of the town, and the amount of coal used in domestic fires.
(*e*) The proportion of vegetable refuse.
(*f*) The temperature of the furnaces, or whether forced draught is in use.

As this residuum amounts to from one-fourth to one-third of the total bulk of the refuse dealt with it is a question of the utmost importance that some profitable, or at least inexpensive, means should be devised for its regular disposal. The following are among the many uses to which it has been put:—

(*a*) Forming bottoming for macadamised roads.
(*b*) Crushing to suitable size, and mixing with Portland cement for making concrete, which may be applied to any of the uses to which concrete is usually applied.
(*c*) Crushing to small size, mixing with cement for making paving slabs.
(*d*) Breaking and sifting and mixing with fine ash for use upon suburban footpaths, or cinder footwalks.
(*e*) The fine ash may be used as a cushion bed for paving sets.
(*f*) Mixing clinker with lime, placing in a pug mill with water for the manufacture of mortar. This is a very general, and in many places profitable, mode of disposal.
(*g*) The fine ash has been suggested as a suitable base for the manufacture of carbolic powder.

(*h*) In some cases, for want of a better mode of disposal, it is used for filling in old quarries, gravel holes, pits, or other depressions in the suburbs of the town.

(*i*) There are also instances where it has to be barged away or sent to sea in steam hopper barges, and discharged in deep water. This is done at Liverpool, the cost of disposal being 2s. per ton.

(*j*) The ashes have been used for mixing with heavy clay soil on sewage farms.

(*k*) It has also been suggested that the ashes would improve the quality of ordinary bricks if mixed with brick-earth and clay.

Manufacture of Flagging for Footpaths.—In the manufacture of flagging for footpaths the clinker may be broken to suitable sizes, and made into Portland cement concrete, and laid *in situ* upon the footwalk about 3in. or 4in. in thickness, and trowelled up to a face. In order to prevent upheaval and cracking, the disastrous effects of which may oftentimes be observed in monolithic concrete footpaths of large unbroken area, the concrete should be laid in alternate lays of not more than 6ft. in width.

Paving Slabs.—Sometimes the clinker concrete, made in the ordinary manner, is placed in iron-lined moulds of suitable dimensions, and rammed by hand punners into the moulds. When the concrete is sufficiently set, the sides of the mould are removed, and the slabs stacked until they are sufficiently hard to lay upon the paths. This is usually from six to nine months after manufacture. The appearance of the flag is somewhat against it, but in Liverpool this has been improved by painting the surface with a fairly strong mixture of Portland cement and water, which has had the effect of brightening the surface and of filling in the interstices in the flags. In Southampton and elsewhere the crockery is taken from the refuse, smashed up, and used for facing the slabs, which, by a slight stretch of courtesy, is considered by some to give them a pleasing mosaic appearance. In speaking upon the durability of this class of slab, Mr. J. Price (Birmingham) has given it as his experience that after twelve years there has not been more than about $\frac{1}{8}$in. wear on flagging in crowded thoroughfares.

Mr. H. Percy Boulnois, M. Inst. C.E., when city engineer of Liverpool, introduced a method of making clinker concrete flags under hydraulic pressure, and has given the following description of the process of manufacture:—[154]

"The plant, which has been patented by Messrs. Musker, of Liverpool, consists of a hydraulic press or 'ram,' the pressure for which is obtained from the Liverpool Hydraulic Power Company, who give a pressure in their mains of 750 lb. on the square inch, which is used for the moving operations; but for the final pressure an 'intensifier' has been introduced between the main and the press, which raises this pressure so that the final pressing operations reach a pressure of 2¼ tons on the square inch. The clinker is broken in a small crusher worked by the engine supplied with steam by the destructor, to about $\frac{3}{8}$in. size, and this is mixed by hand on an ordinary bunker in the proportion of one part of cement to three parts of broken clinker, the compo being mixed very wet.

"The frame in which the mould is placed works in a horizontal direction, upon the rails supporting the frame, by hydraulic pressure, and the mould is filled with the compo when it is outside the press, a pad being placed at the bottom of the mould, composed of a perforated zinc plate covered with thick insertions. When the man (who is filling) has screeded off the top of the mould, he places a felt pad over the mould, pulls a lever, and the frame passes into and under the head of the press. By means of another lever he raises the mould and frame right under the fixed head of the press, and by a third movement he brings the whole pressure from the ram directly upon the slab.

"This pressure is allowed to continue for about a minute, when water from the compo ceases to flow, and it may be observed that owing to the pads no cement comes out with this water. The pressure is then relieved, the frame is allowed to drop, and then withdrawn by hydraulic pressure outside the press.

"Underneath, and level with the ground, a movable platform is provided, which is worked vertically by hydraulic pressure. Upon this platform a small trolley is run, having had previously placed upon it a movable flat board provided with handles, and upon this board the slab is received. In the meantime the frame containing the mould and slab is turned over and the platform lifted, which brings the flat board already referred to close up under the slab, and by turning a handle the nuts pressing against the heavy false bottom, or die at the bottom of the mould are slackened, which then falls and pushes out the slab in the mould; and consequently, when the platform is lowered the slab comes out with it, and is wheeled off on the trolley, and carried on the flat board in question by two men to a suitable position, where the slab is allowed to ripen for a couple of days, and is then up-ended.

"The number of men employed is as follows A lad works the lever handles, fills in and screens the compo in the mould, and three men manufacture the concrete and pack the slabs. About 45 yards of slabs are manufactured per diem, the cost being as follows:—

Cost of manufacture of one yard of clinker concrete flagging 2½in. thick.

Material.	Cost.
*65 lb. of Portland cement	10¾d.
†152 lb. of clinker	nil.
‡Water	¼d.
Labour	5½d.
Plant, contingencies, and supervision ...	3¾d.
Total cost per yard... ...	1s. 7¾d.

* Varies with cost of cement. † Really a saving of 1¾d.
‡ This item could be dispensed with where pressure is obtained by using steam-power of destructor.

"The total cost of manufacture is thus about 1s. 7¾d. per square yard, without reckoning the saving in using the clinkers. The sizes of the slabs that are made are 2ft. by 2ft., 2½ft. by 2ft., and 3ft. by 2ft., each being 2½in. in thickness.

"Some of these slabs have been laid twelve months and show no sign of wear, but sufficient time has not yet elapsed to say whether they will last as long as Yorkshire or other natural stones; but from the experience already gained it would appear that this class of flag will have a life as

[154] "The Disposal or Utilisation of the Residue from Towns' Refuse Destructors." (June, 1896.)

long, if not longer, than Yorkshire flags, and owing to the porous material with which they are made, the clinker-paving slabs have a foothold much better than the natural stones. Their colour is rather dark, but this slight objection may be obviated by painting the flags, after they have been laid, with a mixture of cement and water, which takes some time to wear off.

Tests of machine-made clinker concrete flags, 2½in. in thickness.

Age of flag. Months.	Breaking load applied at centre of flag. lb.
4	1804
4	1474
4	1742
4	1917
4	1608
4	1752
6	2061
6	1966
4	1859
4	1659
4	1589

"The above table gives some tests of these slabs which have been made, and when the youthful age of the slabs is taken into account, they may be considered very satisfactory.

"The total cost of the machinery as supplied and fixed by Messrs. Musker was £1275, the foundations and necessary plant cost £225, exclusive of the clinker crusher, which cost £45, making a total for the whole installation of £1545."

In connection with the above process the Adamant Stone Co., Ltd., in 1896, brought an action against the Liverpool Corporation for an alleged infringement of their patents of 1884 and 1893. The 1884 patent appears to have been for making slabs out of Parian, Keen's, or other cements in a porous mould under pressure; and that of 1893 for using for a similar purpose clinker broken to the size of small shot. The claim for the 1893 patent was dismissed with costs, but in regard to the 1884 patent it was held that the claim was good, and that it had been infringed, and, consequently, on this count judgment was given for the plaintiffs, with costs. Commenting upon this case, the *Surveyor* (December 11th, 1896) says:—"The effect of the judgment appears to us to be that municipal engineers need be under no apprehension that the mixing with cement of clinker (even when the latter is broken to the size of small shot), and the subsequent subjecting of the mixture to pressure, is an infringement of any existing patent. But—and the limitation is one it would be as well to note carefully—if this pressure is effected in a *porous* mould the process is an infringement of the 1884 patent of the Adamant Stone Company. Moreover, it is also worth noting that, in the ordinary course, the company's patent can only run for two more years."

The defendants appealed, but ultimately it was ordered to stand over until the adjournment, with a view to a settlement. The appeal was then withdrawn, in accordance with an arrangement between the parties, the terms of which did not transpire.[155]

In regard to the utilisation of the residue from destructors, Mr. N. Blair, M. Inst. C.E., of St. Pancras, said, at a meeting of municipal engineers at Brighton (June, 1896), as his Vestry had to pay for the removal of this residue, he had endeavoured to find other methods of treating fine ash and clinker, and to show whether it would compare favourably with other material he made briquettes of cement composition, using in some of the most suitable clean sand, and compared them with cement briquettes made of fine ash or of crushed clinker. One might naturally expect to find that the selected sand would give better results than the briquettes made of this composition from the fine ash, and he was surprised to find that it was otherwise. The result upon briquettes of 1 square inch section, in which the proportion was 3 to 1 of fine ash and cement, at three months was 204 lb. breaking strain, and in the case of the briquette made of the best sand obtainable for the purpose, 179·5 lb. The ordinary Thames sand, which is very largely used in London, dropped down to about 46 lb.; so that the cement composition made of the fine ash of the destructor furnace proved better than that made from the best sand obtainable. It was the same with concrete. He had some concrete blocks made for testing purposes. The first lot of blocks—12in. cubes—were mixed 5 to 1. The blocks made of clinker taken from the furnace mouth, containing tins and all classes of fine material, mixed in the proportion of 5 to 1 with cement, broke at the age of three months under a crushing weight of 55·6 tons. Rough Thames ballast containing stone from 2in. diameter down to sand, mixed in the same proportions and at the same age, broke at 45·2 tons, and fine Thames ballast containing pebbles from ¾in. down to sand broke at 23·7 tons, so that in this case also the concrete made of clinker, just as it came from the furnace mouth—not selected, not even riddled—gave the best results.

Mr. Blair has also attempted to convert the fine dust into carbolic powder. A sample was examined by a firm of manufacturers, who reported that they thought it was very suitable, and offered to make carbolic powder from the dust, employing the same proportion of acid as in the ordinary 15 per cent. powder. This they could sell at 25s. per ton less than the ordinary powder of commerce.

Mr. J. H. Cox, M. Inst. C.E., of Bradford, has had destructor flue dust analysed, and found there was very little nitrogenous matter in it—in fact, it was not worth naming as to its value for manurial purposes. It was only ·023 per cent., but the analyst said it might be useful to manure manufacturers for some of their preparations which require an absorbent.

At one depôt in Bradford there are twelve cells, burning 24,000 loads in a year, producing approximately 6000 loads of clinker, 2000 loads of which are made into mortar. Being in a flag-stone district, the question of providing machinery for slab making has not been fully gone into; but a good outlet for the material has been found in putting up crushing and screening machinery. The clinker is crushed and screened into various sizes, and is proposed to be used for making common asphalt by mixing with pitch and tar, and using on the suburban foot-walks.[156]

[155] The *Surveyor*, March 12th, 1897.

[156] "Proceedings" of the Association of Municipal and County Engineers, vol. xxii.

THE SANITATION OF DOMESTIC BUILDINGS.

By Frank Latham, C.E., M. San. Inst., &c., Assistant Surveyor, Borough of Margate.

(*Concluded from page* 478.)

CHAPTER VII.

Section 2.

DRAIN CLEANSING.

Having in the foregoing articles given a general description of the work appertaining to house drainage, a few details with regard to their maintenance in a clean and sanitary condition will perhaps be useful. Although this operation seems an easy matter, especially where the drains have been carefully executed, yet in very few cases do the drains, when once carried out, receive that amount of attention at the hands of occupiers as is requisite for their maintenance in a cleanly condition. It is further an astonishing fact, that in hotels and factories it is far from an uncommon occurrence to find the drain literally choked with foreign substances, particularly so in the former. The writer has had instances where complaints have been made of drain stoppage, and which upon investigation have been found choked full of pea pods and other such articles, which had been thoughtlessly disposed out of sight down the nearest inspection chamber. It is also a frequent occurrence to find the drains of hotels blocked with fat, especially where the cook has no personal interest in saving such matters.

There is again the frequently complained of gully trap, which is used year after year without attention, till a nuisance is created, and the Sanitary Inspector is summoned to search for the offender, and finds perhaps the gullies choked with filth, and of little or no use as a seal against the escape of drain air. A neglected grease trap is also a constant source of nuisance, and will sometimes throw off most disgusting odours.

The sink waste syphon sometimes becomes stopped, and this instead of being gently cleared by removing the thumb screw provided for that purpose, is more often ineffectually forced by some inexperienced person. The water-closet and such appliances require occasional attention, to remove the incrustation that forms in the trap, &c., otherwise a fetid odour will be inseparable to them. Cisterns used to hold water for drinking and domestic purposes require to be regularly emptied and cleansed, which rule also applies to rain-water tanks, especially as the latter are often situate under ground and sometimes under the floor. The writer only recently investigated the case of an old tank, wherein, amongst other things, three rats were found; in another instance several dead birds were found in a cistern in the roof.

Ventilation pipes should be periodically examined, and any rust or scaling that might have lodged at the bend, or birds' nests, removed. There are also occasional articles, such as nail and tooth brushes, combs, pumice stone, and like obstructions, which gain access to the drains, and become lodged in the traps, &c., and if not removed will soon cause trouble. The insufficient flushing of drains, resulting from cisterns being out of order, is likely to cause them to become choked, and also to event in a dangerous nuisance, which cannot be too carefully guarded against.

As was explained in Chapter V., one of the principal aims in construction of house drains should be to give inspection facilities to the whole system, so that, in the event of obstruction, ready access could be given for the speedy detection and removal of the cause, without disturbing or damaging the soundness of the work.

Numerous appliances are used for clearing and cleansing purposes, the principal of these articles being as follows:—Drains cannot be effectually unstopped and cleansed without the aid of clearing

Fig. 97.

rods, a set of which should be in possession of every large establishment. They consist of short malacca canes, and are jointed together for use by means of brass male and female screw connections. They are usually 3ft. in length, and are strapped together in convenient bundles of from ten to thirty-three rods. There are a number of fittings used with these drain rods for various purposes; one of the most useful being the double-worm screw and guide wheel (Fig. 97). By its use such obstructive articles as rags, dishcloths, and paper can be removed. The double-spiral screw is particularly handy in unstopping intercepting traps from the air shaft. Some other useful accessories are the jointed scraper, which is employed for raking purposes. The spring hook which, being chisel shape, is for breaking through accumulations of solid obstructions in drains. The

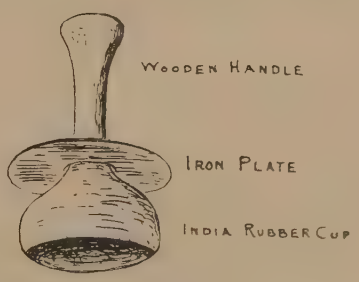

Fig. 98.

rubber plunger is for forcing choked drains, but this work needs to be carefully done, as there is a danger of pressing the obstruction tighter into the drain. The brass guide wheel is used to conduct the rods round corners, and the whalebone or bass brush with guide wheel is used for sweeping and cleansing drains.

There are also several other articles for cleansing purposes; the closet brush is for removing any incrustation from the basin and trap; the gully ladle for removing filth from gully traps; and the sink force cup (Fig. 98) being amongst the most useful.

THE CUTTING-OFF POWERS OF WATER COMPANIES.

By Dr. T. ORME DUDFIELD, M.O.H., Kensington.

THE Public Health (London) Act, 1891, Sec. 49, gives effect to the recommendation made by me many years ago, that a metropolitan water company should be required to give information to the Sanitary Authority, when, from any cause, they had exercised their statutory right to cut off the water supply of an occupied dwelling-house. Every company is now required to give such notice within twenty-four hours after exercising the said right, under liability to a fine not exceeding £10 for default. The power to cut off the supply is, no doubt, of some value to the companies, for "an occupied house without a proper and sufficient supply of water," is "deemed unfit for human habitation" (Sec. 48). In all such cases reported by the several companies, the Sanitary Authority are obliged to take steps to ensure restoration of the supply—which is necessarily preceded by the payment of the company's claim. The cutting-off powers were materially limited in 1887, by the Water Companies (Regulation of Powers) Act, which is described as "an Act to limit the powers of the water companies to cut off the tenant's water supply when the rate is paid by the landlord," as is very generally the case in regard to tenement houses and houses otherwise occupied in lodgings, &c., by the poorer classes. The beneficent result of this legislation is, that the water supply of the poor is generally secured, and that without loss to the companies.

The time has come that the power to cut off the supply from an occupied house should cease; and that, as I suggested, in 1882, "the company should be left to their remedy for the recovery of the rate as a debt, like other traders," and not be allowed to create a dangerous nuisance merely as a coercive measure for securing the payment of the rate. One enlightened company, the East London, resolved some years ago to abandon the barbarous practice of cutting off; and, I am informed by the secretary, have had no cause to regret the decision. They sue the defaulter, and the result is stated to be, on the whole, "highly satisfactory." The New River Company also, I understand, summons largely in preference to cutting off, and other companies now, probably, are following suit. Defaulters are summoned in the Police-court; but the magistrates have no jurisdiction unless the company proceed within six months of the debt becoming due; and the debt, *i.e.*, the rate, is due in advance. Inasmuch, therefore, as the companies only collect half-yearly, they must proceed before the expiration of the six months, and hence have to sue before the second quarter has expired, which appears to be a hardship. If greater facilities were given to the companies for recovering this rate, probably they would be willing to waive their right to cut off the supply, or consent to its abolition. I do not suppose that a question of this sort comes within the limits of the inquiry now being made by the Royal Commission on Water Supply. It might, however, well be brought to their attention. From the public health point of view, it is one of great importance.

As already stated, a technical nuisance is created by cutting off the water supply. Actual nuisance also may result, of which a striking instance has recently occurred at Hooper's-court and Garden-row, Knightsbridge. This property, shortly to be demolished, comprises thirty-four little houses built many years ago on garden spaces at the rear of houses in Brompton-road, a few doors west of Sloane-street. Hooper's-court comprises twenty-six houses, Garden-row eight. On the 21st March, the weekly tenants living in Hooper's-court (No. 7 to 26) and Garden-row, received notice to quit the houses, of which many of them had been in occupa- for a considerable number of years. They are described to me as respectable people, who paid their rent, and found employment in the locality. The number of persons affected by the notices, estimating five to a house, would be about 140. Needless to say, great distress was caused by the requirement to leave, owing to the difficulty of finding new homes. Some of the people succeeded in doing this; others, in occupation of eleven houses, lingered on after the 28th, trying their best, as I am informed, to find lodgings within a convenient distance of their work.

Technically, of course, they were trespassers. In order to get them out, by making their homes unfit for human habitation, the Chelsea Waterworks Company were ordered to cut off the water supply, for which the landlord was liable under "Forrest Fulton's Act," the commonly known title of the "Water Companies (Regulation of Powers) Act, 1887." The order, given on 13th April, and executed on the 21st, gave rise to an abominable nuisance by the choking of the water-closets, the pans of which, at the present writing, are full and overflowing. This matter was brought to the attention of the Sanitary Committee on the 26th ult. The Committee directed the issue of two notices; one requiring the owner to lay on the water, and the other requiring him to unstop the choked water-closets, within two days. The Surveyor was instructed to have these closets unstopped, in the event of failure on the part of the owner, the cost of work to be charged to the owner, who, as owner, is liable for the abatement of the nuisance. Whether the owner can be made to restore the water supply is perhaps doubtful. Had the tenants been in legal possession, the Company could not have deprived the houses of water had the owner failed to pay the rate. Forrest Fulton's Act would have prevented this. Having regard to the circumstances above set out, I hoped that the Company would have turned on the water for the use of the people for the short time they are likely to remain in the houses; the cost to them of such an act of benevolence, not to say humanity, would have been infinitesimal and absolutely inappreciable.

SHEFFIELD.—Some alarm has existed at the West End on account of an outbreak of scarlet fever at Ranmoor. Twenty-four or twenty-five cases have been reported to the Medical Officer of Health, who has taken adequate steps to prevent the spread of the infection. All the cases are satisfactorily isolated. The Medical Officer has traced the origin of the fever, and there is no likelihood of a recurrence. Residents at Ranmoor and Broomhill may take it that the worst is now over, and that, though several households have been attacked, there has been nothing in the nature of an epidemic.

Food and Health

SUPPLEMENT TO

THE SANITARY RECORD.

No. 16. MAY, 1898.

FOODSTUFFS UNDER SCRUTINY.

WHAT TO EAT AND DRINK, AND WHAT TO AVOID.

"SANITARY RECORD" ANALYSES.

IMPORTANT ANNOUNCEMENT.

OWING to the growing popularity of this feature of our "Food and Health" Supplement, we have found it necessary to make arrangements whereby, in future, much fuller reports will be given of proprietary articles than have appeared hitherto. It has been our custom to solicit samples of articles for investigation from the manufacturers direct, unconditionally; but in future such samples as we receive from the proprietors thereof will require to be accompanied by a declaration that the sample is selected from stock, and not put up for the special purpose of analysis. Failing this we shall make the purchases ourselves, selecting the articles at random from the various retail establishments where they are sold.

We have retained the services of Mr. C. G. Moor, M.A., to examine and report on the various substances submitted to us.

All such analyses may of course be quoted as having appeared in THE SANITARY RECORD, but the date must be given, and Mr. Moor's name must not be quoted for advertising purposes without special permission.

"Sap" Brand Humanised Milk and Koumiss.

I HAVE duly examined the samples of Humanised Milk ("Sap" Brand) and Koumiss, prepared by the Milks Preparations Company, Brentwood.

Both of these preparations are thoroughly satisfactory in every way. The Humanised Milk, as will be seen from the figures below, is as exact a copy of healthy human milk as can possibly be prepared. Comparing the composition with the average constitution of a large number of the most trustworthy records of analyses of human milk by Pfeiffer, Leeds, Meigs, Johannessen, and Rotch (page 9, "Milk and Milk Products," Pearmain and Moor), it will be noted that the "Sap" Brand is almost identical with the averages there given for fat and albuminoids, while a little low in milk-sugar.

The figures yielded by these two preparations are as follows:—

	Humanised Milk.	Koumiss.
Fat	3·50	1·40
Albuminoids	1·36	1·33
Ash	·48	·53
Milk-sugar	4·81	2·91
Proof spirit	—	1·00
Water	89·85	92·83
	100·0	100·0

The Koumiss is well prepared, of pleasant flavour, and satisfactory as regards its composition.

FOOD ADULTERATION FRAUDS IN FRANCE.

M. DE NANSOUTY has recently been withdrawing the veil which conceals the composition of coffee in France. He tells us that even the careful man who buys his coffee in the green berry is not altogether safe; very inferior berries are dyed to match the better sorts, or some of the berries are made of clay moulded and dyed to look like the genuine berries with which they are mixed. If he buys his berries roasted he is more easily deceived. The artificial berries in this case are made of coffee grounds mixed with baked flour. The berries, false and true, are then roasted with a little fat, white of egg, sugar, or molasses, and acquire a beautiful brown varnish "pleasing to the eye."

The weight of both green and roasted berries is increased by exposing them to steam so that they imbibe moisture. But the man who buys his "coffee" ground is indeed rash. The list of constituent parts is long: chicory (which itself is sometimes adulterated!) beetroot, turnips, parsnips, carrots, dandelion, acorns, horse-chestnuts, hazel nuts, figs, prunes, couch-grass, pistachios, almonds, walnuts, pea-nuts, dates, apples, pears—all these substances, generally in "damaged" condition, are mixed together, ground and roasted, and mixed with a little real coffee. In a recent instance ground stone was found to have been added, but this was considered to be carrying business enterprise too far even for a Belgian, and the parties are thought likely to be punished. Some manufacturers add the sweepings of the warehouse, so that the powder which is then put up in tins and labelled *café de luxe* must have a fine confused flavour.

As to the milk, a certain improvement has taken place in many continental cities. The Dutch

official analyst, for instance, when he began his examinations in Rotterdam in 1893, found that 70 per cent. of the milks he tested had been tampered with; the percentage had fallen in 1897 to 3·3. In Brussels lately a batch of twenty milk sellers were summoned and fined. One man admitted that his milk had been "baptised," but he argued that it was good enough for *les Bruxellois*. A woman had put a notice that her milk was skimmed, on the handles of her jugs. What more reasonable for a milk seller than to hold a jug by its handle? If the buyer did not then see the announcement on the handle, what of that? the ingenious lady argued—it was there.

Finally, and not to prolong unduly this list, it may be said that the mayor of a small commune in France is now "wanted" on a charge of mixing plaster of Paris with his flour. He did not deny the fact, but said that he merely sold the flour, and had no idea that anybody would be so indiscrete as to use it as food. When, however, it was proved that most of his customers were bakers, or bakers' brokers, the mayor thought it well to leave home in order to "collect some debts." Butter is, of course, largely adulterated in Belgium. At Liége nearly one-fourth of the samples taken contained margarine in proportions varying from 30 per cent. to 75 per cent. Bearing in mind the easy-going way in which we admit milk, butter, and other food products into this country, it is worth while to call attention to these official records of the extent to which the practice of adulteration prevails in neighbouring countries ambitious to supply our markets.

DANGER IN EXCLUSIVE MEAT DIET.

Modern Medicine contains a short paper on the above subject, from which we extract the following:—It is apparent that in a case of a person subsisting upon a flesh diet, two evils result:—

(1) An increased rapidity of disassimilation, whereby tissue wasting occurs at too rapid a rate.

(2) A saturation of the system with tissue poisons.

When the urine contains three to four times the normal amount of urea, and other toxic poisons in like proportions, it is an indication that the whole body is, to a similar extent, saturated with these poisonous substances.

Another item of interest in the table of Lotz is the fact that the alkaline sulphates, which are products of intestinal decomposition, were entirely absent under a non-nitrogenous diet. Under a mixed diet the amount was found to be seven grammes, and under a nitrogenous diet ten grammes.

From these facts it must be apparent that nothing can be more dangerous in cases of Bright's disease, and in all cases of renal insufficiency, than a flesh diet, and that the greatest safety for the patient is to be found under a diet from which flesh food is excluded. It is also easy to understand why a flesh diet is particularly dangerous in diabetes. In this disease, in which there is naturally a tendency to waste, and to toxæmia through a failure of the kidneys to maintain a condition of requisite tissue purity, the employment of a meat diet not only increases wasting, but also greatly increases the tendency to general poisoning from the accumulation of excrementitious elements.

HOW THE SALIVA ASSISTS THE DIGESTION OF FOOD.

Even the merest tyro in physiology is familiar with the fact that the saliva not only prepares the food so that it can be readily swallowed and acted upon by the gastric and intestinal juices, but that it contains a ferment which possesses to a high degree the ability of commencing and even carrying to completion the transformation of starch into sugar, or, in other words, the preparation of carbohydrate materials, so that they can be readily absorbed and appropriated to the various uses of the economy.

For many years when patients came to a physician complaining of symptoms of indigestion it was the custom to administer pepsin and hydrochloric acid under the erroneous idea that it was the proteids in the food which were not properly treated by the digestive juices, and that relief could be obtained by aiding the stomach in the manner indicated.

Only comparatively recently has the importance of pancreatin digestion been recognised as surpassing that carried out by the gastric juice, and still more recently has the profession come to realise the fact that in many cases the predigestion of starchy foods, or the administration of diastatic ferments capable of aiding in their digestion, is in a certain proportion of cases far more important than the administration of pepsin or pancreatin for their proteolytic action.

Recent studies which have been made in the laboratories of Yale University emphasise the value of the saliva as a digestive juice. They were carried out by Professor Chittenden, who reported his results at the last meeting of the American Physiological Society in Ithaca. This investigator showed that great variations in the amyolytic power of the human saliva take place. Thus, he found that saliva collected before breakfast is stronger in amyolytic power than that secreted after breakfast. He also found that this greater power before a meal is not due to any increase in alkalinity, but to the greater concentration of secretion coming from glands that have been resting. He also discovered that stimulation of the mucous membrane of the mouth by the vapour of ether or chloroform, or by any other substance which irritates that mucous membrane, causes a secretion richer in digestive powers and solid matters than that caused by mere mechanical stimulation.

Professor Chittenden's experiments indicate the fact that those persons with deficient digestion of the starchy articles of food should avoid chewing any such substances for a considerable period of time prior to a meal, as by this means the salivary glands will have an opportunity to rest and the liquid which they pour out when starch is taken will then be competent to digest its share of the meal. Where tobacco, for instance, is placed in the mouth and kept there until the time of the meal the salivary glands are not only unable to secrete enough amyolytic ferment to aid in the digestion of the starch, but are also unable to

secrete enough fluid to thoroughly soften and disintegrate the food, and as a result the indigestion of all articles of food ensues, since the pabulum when swallowed is not in a fit condition for gastric or duodenal digestion.

INTERESTING FACTS ABOUT CHEESE.

The manufacture of the richer and more expensive brands of cheese, which is carried on for the most part in Europe, is an exceedingly interesting process, requiring an immense amount of skill and patience. The knack, or art, of making certain kinds of cheese has never been successfully imitated, and the natives of certain parts of the Continent of Europe, therefore, still retain a sort of monopoly of the trade. The modern cheese manufacturers, with all their scientific methods and apparatus, have failed where these simple peasants have succeeded. It is not generally known that the familiar Roquefort cheese comes from a town of the same name in the south-western part of France.

The cheese is made from cow's milk, and the curious little green particles are merely the crumpled coarse bread of the peasants, which is thrown into the cheese. The cheese is first made by the peasants throughout that part of the country and then carried to cellars regularly prepared for it, where it is stored to give it its peculiar flavour. These cellars are hewn out of the solid rock along the sides of the hills, and it is thought that some peculiar property of the stone or the dampness serves to give the characteristic flavour to the cheese. These cellars are constructed at considerable expense, and are owned by syndicates, who construct them and charge the peasants for storing the cheese there, or they buy the cheese outright and cure it themselves. This picturesque little section has an undisputed monopoly of the trade.

The Brie cheese also comes from a town whose name it bears. It lies to the north of Paris, and regularly exports immense quantities of cheese. This cheese is also made of cow's milk. It has been successfully imitated in other countries, notably in America. At the present time there is, as a matter of fact, very little of it imported from France. Limburger cheese, which was once manufactured exclusively abroad, is also produced in America so successfully that the importation of it has been entirely stopped.

The most expensive cheese manufactured is the truffle cheese, which is imported from France. This cheese, as its name suggests, is made of truffles, and is worth about a dollar a pound in France. The familiar Edam cheese, which is made in Holland, is also imported in considerable quantities. The sago cheese, which is made from the milk of goats, is manufactured in Switzerland by the peasants, and imported in large quantities. The cheeses bearing English names, which find a large sale in America, are made for the most part in that country. The farmers in New York State have become so expert in manufacturing many of these brands that this American cheese is now being exported to England, and is sold in competition with the original English cheeses.

BEVERAGES: BENEFICIAL AND OTHERWISE.

Water is a most important article of diet. It forms 60 per cent. to 70 per cent. of the body. In milk, which we have taken as a type of a perfect food, there is 80 per cent. of water. It is essential that water should be pure and free from all contamination. Many diseases, such as cholera and typhoid fever, are frequently introduced into the system by water.

If the purity of water is suspected it should be boiled before being drunk. The insipid taste of boiled water, which depends on the air suspended in it being driven off by boiling, can be removed by pouring it into a bottle till it is three parts full, and then shaking it well. This restores the air which has been driven off. Filtering by the ordinary filters is of no use in getting rid of germs, which are the most important contamination of water. Hard water may produce some kinds of disease, but boiling will make it softer.

A sufficient quantity of water is necessary to supply the tissues of the body, and to flush out the secretions from different organs. If too little fluid is taken it may lead to disease. A tumblerful or two of hot water at bedtime is very useful in washing away the *débris* of digestion, and preparing the stomach for more efficient work on the following day. Sipping hot water slowly gives warmth to the body, and acts as a stimulant by quickening the pulse. Drinking too much fluid during meals tends to retard digestion by diluting the gastric juice.

The other beverages most frequently used are tea, coffee, and cocoa. It is a curious fact that Nature has taught man in different parts of the world to use these beverages, each of which is found to contain an active principle having nearly the same composition. They act as stimulants, causing exhilaration, exciting the brain, producing wakefulness, and relieving the sense of fatigue. When partaken of moderately they are most useful, but when indulged in too freely may produce some untoward symptoms.

Tea and coffee affect different people in various ways, and the same individual may be differently influenced according to the condition he may be in at the time. Tea may delay the digestion of certain substances, when taken with it, such as butcher meat.

The over-infusion of tea is injurious, not on account of the tannin, as is usually supposed, but on account of other deleterious products. Inferior teas are infused more quickly than teas of good quality. Tea should never be boiled.

Alcoholic drinks are not necessary in health, because the highest health, mental and bodily, can be attained without their use. Thousands of our soldiers and sailors are doing all the hard work and enduring the fatigue of campaigns without partaking of them. It has been proved that all conditions of climate, even the extremes of heat and cold, can be well borne without alcohol in any form.

Alcohol is not a true food in the sense that it does not supply to the body any material required for building it up. The best that can be said for it in this connection is that by diminishing the oxidation of the tissues it lessens the necessity for food,

CONDENSED MILK: ITS COMPOSITION AND VALUATION.

Specially contributed by C. G. Moor, author of "Milk and Milk Products."

This article of food has at the present time come so universally into favour, both for every-day use on account of its convenience, and for the feeding of children, that it is well that attention should be drawn to the true composition of the many brands, some sixty in number, that are now on sale in this country.

So far as I have been able to learn, condensed milk seems to have been first used to any appreciable extent about forty to forty-five years ago, when it was bought more out of curiosity than anything else. Since then the trade has rapidly increased, till now it is one of the highest importance.

There are now three kinds of condensed milk sold in this country:—(1) Unsweetened condensed milk, (2) sweetened condensed milk, (3) sweetened skimmed condensed milk.

The first of these alone has really the right to the title condensed milk, though this term has by general consent been applied to the ordinary condensed milks which contain a large addition of cane sugar. Macfarlane, the Chief Analyst to the Canadian Government, in "Bulletin, 54, 1897," says that milk which has been condensed with the addition of sugar should bear the label, "Condensed Milk Mixture," or "Sweetened Condensed Milk." Of the first class, namely, the unsweetened milks, we have now several brands in this country, all of which are well prepared from milk containing its full proportion of cream, and without any preservative.

The following figures were obtained by me on some of these milks in 1895, and published in the *Analyst* for December. Since then I have examined them on several occasions, and have found their composition to be very constant, while they were always perfectly sound and well preserved:—

First Swiss Brand.

Fat	10·5
Milk-sugar	14·2
Proteids	9·7
Total solids	36·7

Ideal Milk.

Fat	12·4
Milk-sugar	16·0
Proteids	8·3
Total solids	38·0

Hollandia.

Fat	9·8
Milk-sugar	18·5
Proteids	11·3
Total solids	43·0

Viking.

Fat	10·0
Milk-sugar	13·2
Proteids	9·0
Total solids	34·2

In the case of this latter milk I have examined it regularly every year, and find its composition very constant and somewhat richer in fat than in the above analysis.

If we study the above figures we shall see that all these four milks are prepared by evaporating cow's milk of good quality down to one-third, consequently to prepare ordinary milk from them they will require the addition of two parts of water to one part of milk by weight.

The second class, or the sweetened condensed milks, is the most important, and the three best-known brands are probably the Anglo-Swiss, Nestlé's, and the Milkmaid, on which the following figures were obtained:—

Anglo-Swiss.

Fat	10·8
Milk-sugar	16·0
Proteids	8·8
Cane-sugar	37·1
Total solids	74·4

Nestlé's.

Fat	13·7
Milk-sugar	15·0
Proteids	9·7
Cane-sugar	37·2
Total solids	77·2

Milkmaid.

Fat	11·0
Milk-sugar	14·6
Proteids	9·7
Cane-sugar	38·7
Total solids	76·3

Nestlé's condensed milk appears to enjoy the distinction of possessing the largest amount of fat of all condensed milks.

In addition to the above mentioned there are twelve or fifteen other brands of condensed milk containing a proper proportion of fat, namely, not far below 10 per cent. by weight.

Some few years ago another class of milks was common, which were sold as "partly-skimmed milks," and contained varying amounts of fat, generally very little. This class has almost disappeared, and it is just as well that this is so, for it is simply an attempt to induce people to purchase a skimmed condensed milk on the idea that a part of the fat has been left in—what proportion, is left to the imagination. In January, 1897, I examined two condensed milks stated to be partly skimmed, and found practically no fat in either.

The law relating to the sale of condensed milk (and other foods) provides that the label must disclose the true nature of the package, and hence a tin of skimmed condensed milk must bear the word skimmed or separated on it. In many cases this is printed in microscopic letters which would never be noticed by the ordinary purchaser.

Time after time attention has been drawn to the fact that a skimmed condensed milk is not a suitable food for infants, as its constituents vary very greatly from the composition of human milk, and a moment's calculation will suffice to demonstrate this.

A young child with a healthy mother gets some 30 ounces of human milk in the 24 hours, which contains 12·3 per cent. of total solids, that is 4·1 ounces, in a day and night; this is made up of a little over 2 ounces of milk-sugar, rather more than 1 ounce of fat, and less than an ounce of proteids.

Now the composition of skimmed condensed milk

being as follows (an average from a number of skimmed condensed milks) :—

Fat	1·0
Milk-sugar...	15·0
Proteids	10·0
Cane-sugar...	40·0

It is obvious that nothing short of adding cream can possibly enable us to make a food out of it similar in composition to human milk.

But apart from the unsuitable composition of skimmed condensed milks, the directions given on some labels as to the dilution are calculated to kill children, and undoubtedly do so.

A. McGill, in the Canadian bulletin above mentioned, has found just the same thing in Canada. He says, "I have before me a brand of milk from which practically the whole of the cream has been removed, and which nevertheless instructs the purchaser to 'add 4 to 5 parts of water,' adding, 'if less water be added, it may be used instead of cream.' The same label instructs the purchaser to add 14 parts of water for the feeding of infants. This, it is needless to say, would be to put the unfortunate infant on a starvation diet."

In the paper on condensed milk in which the figures before quoted appear (*Analyst*, December, 1895), in referring to the unsuitability of skimmed milks for children, I suggested that in addition to the disclosure at present required by law, it should also be made compulsory to add the words "skimmed milk is unfit for the nourishment of children."

This is clearly seen by considering the composition of the liquid that would be produced on diluting a skimmed milk according to the directions given with many of them. Thus, supposing 14 parts of water are directed to be added, we should get a liquid containing only 4·4 per cent. of total solids, or about one-third of the amount present in human milk, while over half of the nourishment thus given consists only of cane-sugar without any fat whatever!

Even in the case of many of the well-prepared sweetened condensed milks the directions as to dilution are far too enthusiastic, and would result in the production of a very weak liquid indeed, though by no means so bad as in the case of the skimmed condensed milks.

Taking it all round, however, it must be admitted that our condensed milks in this country are much better and greatly more uniform composition than those sold in America or Canada.

For instance, if one collects a number of analyses of any one of the better-known milks sold in this country it will be found that its composition will be very much more uniform than is the case abroad. It is a rare thing for the fat to vary more than 1 per cent., even over a period of years; whereas an inspection of the figures obtained by McGill and other official Canadian analysts shows very wide variations on the same brand even when the samples were all purchased about the same time. In America, too, Charles P. Worcester (Massachusetts), in the years 1892, '93, and '94, analysed a number of milks, many of which show very considerable variations in their composition, even of the same brand, while their general quality is decidedly poor, and for the most part contained a lower quantity of fat than they should have if prepared from whole milk.

Mr. Gill has found salicylic acid as a preservative in Canadian milks, but I do not think that preservatives are used to any extent in the milks sold in this country; boric acid at least is not, as I have never detected it, though a large number of samples were examined for it. There is no need to use any preservative in the manufacture of condensed milk, as if the tins are sound it will keep indefinitely. Preservatives, if used, should be acknowledged.

Adulteration, properly speaking, does not exist at present, except in so far as passing off skimmed milk as condensed milk, though the giving of wilfully misleading directions for dilution ought to be an offence under the Food and Drugs Act.

I have been informed that in Germany condensed milk has been prepared, into which foreign fat (margarine) has been incorporated, and some enterprising persons in Glasgow have taken out a patent for the following enticing preparation (English Patent 2081, 1896) :—"Milk products, condensed, improvements in the manufacture of," W. F. Maclaren and A. Smith Fleming, of Glasgow.

"The object of this invention is to prepare a wholesome condensed milk from separated milk. Forty gallons of milk are mixed with 28 lb. of sugar and condensed to about 100 lb. To this is then added an emulsive compound consisting of 12 lb. of refined beef oil (oleo oil), 8 lb. of lime water, 1 lb. of corn flour, and 12 lb. of sugar. The emulsifying is preferably carried out in a steam-jacketed pan provided with an agitator, the lime water being gradually added during the mixing operation." This pleasing mixture could not be sold as condensed milk without the vendor being liable under the Food and Drugs Act, nor if it were sold in this country would he escape detection for long.

A similar attempt to add a fat to separated milk is mentioned in a Victoria newspaper (1895), in which a Mr. Munro exhibited a "condensed milk," prepared by adding to separated condensed milk a "compound," presumably an emulsified fat. The report states that the inventor did not claim that this preparation was fit for feeding children, in fact, he proposed to state that it was not suitable for this purpose on the labels.

The addition of any foreign fat would be easy of detection; all that is required is to extract the fat from about 50 grains of the sample by ether, having first mixed the condensed milk up with sufficient anhydrous copper sulphate to produce a powder that can be treated with ether or gasolene in a Soxhlet. The fat so obtained, after being warmed till quite free from the solvent, can then be examined by the Valenta test, and will, if true butter fat, form a clear solution with an equal volume of glacial acetic acid at a temperature below 40 deg. Cent., while foreign fats under similar circumstances remain turbid, and do not become clear till a temperature of 70 deg. or 80 deg. Cent. is reached.

THE cost of feeding the American army and navy is estimated to be nearly 1,000,000 dols. per day. If the conflict is prolonged to the end of the year, and the U.S. army invades Cuba, this sum will be more than doubled. Add to this the loss through so large a body being non-productive, and some idea is gained of the awful costliness of war.

SANOSE: A NEW DIETETIC.

This preparation appears to fill a place which has long been unoccupied as a means of administering nitrogen in an easily assimilable form to persons who cannot tolerate meat, or cannot be allowed foods containing sugar. It consists of a mixture of albumose and the casein of milk, and forms a fine white powder, which is quite free from taste, and forms a very perfect emulsion with water. It is hardly necessary to state that mere chemical analysis alone cannot give us adequate information as to the dietetic value of such a substance as this without such confirmatory evidence as is afforded by feeding experiments. Chemically examined, our analyst tells us that it contains *over* 80 *per cent.* of nitrogenous matter, which fully bears out the statements as to its preparation. What little ash remains on ignition consists of phosphates of calcium and potassium.

This preparation has been tested in actual practice by German medical men of the highest reputation, and their published results leave no doubt as to its value.

The application to which this preparation appears most particularly suitable is its administration with milk, the nutrient value of which may be greatly enhanced by its admixture. We may safely prophesy a wide field of usefulness for this unique and valuable preparation.

Sanose is prepared by Messrs. E. Schering, of Berlin, and obtainable from Zimmerman, 9, St. Mary-at-Hill, London, E.C.

DAIRYMEN AND THEIR SERVANTS.

IMPORTANT DECISION.

The case of "Roper *v.* Knott," which was recently decided by eight judges in the Court for Crown Cases Reserved, and remitted to Mr. d'Eyncourt at North London for conviction, came before the Court on Saturday, the defendant, Charles Knott, surrendering to be dealt with.

Mr. Walter Windsor appeared for the prosecution.

Mr. Roper, a dairyman in a large way of business at South Hornsey and Stoke Newington, said that on January 11th last the prisoner was detected watering his master's milk. He was charged with wilful damage; but ultimately the magistrate, acting on the authority of the case of "Hall *v.* Richardson," dismissed the prosecution, holding that no wilful damage in law had been committed. That finding was indeed the only finding that the magistrate could arrive at while the case of "Hall *v.* Richardson" remained as the governing case. The Divisional Court took the same view; but Mr. Roper, not being satisfied with the existing state of the law, which gave the milk carrier so much opportunity of defrauding his master, carried the appeal to the Court for Crown Cases Reserved, where eight judges decided that wilful damage had been committed, and the case was ordered to be remitted to the magistrate for conviction.

Mr. d'Eyncourt said that he had dismissed the charge against the accused not because he believed the man innocent, but because of the state of the law which was brought about by the decision in the case of "Hall *v.* Richardson." He fined defendant £4, 10s. 8d. the damage, or a month's hard labour.

FOOD AND FINANCE.

DR. TIBBLES' VI-COCOA (1898), LIMITED.

The statutory meeting of the shareholders of the above company was recently held at the registered office, 60, 61, and 62, Bunhill-row, E.C., Mr. Alderman Treloar presiding.

The Chairman, in the course of a lengthy address, referred to the present satisfactory position of the company, paying a glowing tribute to Messrs. S. T. and C. H. Williamson, and to Mr. Smith and Mr. Osborne, the four gentlemen who had brought the enterprise to its present unique position—a position which, he ventured to say, was without parallel. The causes which contributed to the great increase of business were reviewed, and were classed by the speaker as due (1) to the intrinsic merits of Vi-Cocoa, and (2) to the large amount of advertising given gratuitously by certain other cocoa manufacturers. After refuting the malicious statement which had been made to the effect that the company had been fined for adulteration, the Chairman went on to say:—

"A more pleasant subject is that of another gratuitous and splendid advertisement we have received from no less a person than the Chancellor of the Exchequer, who is, I shrewdly suspect, a habitual drinker of Dr. Tibbles' Vi-Cocoa. At all events, he is not an opponent of our company. When introducing the Budget on the night of the 21st April, Sir Michael Hicks-Beach, speaking of the increased and increasing consumption of cocoa in the country, made special reference to Dr. Tibbles' Vi-Cocoa in the following terms:—'Cocoa did remarkably well. Of course the receipts from the duty on cocoa are small, only £183,000, but out of that sum no less than £39,000 was an increase over the previous year. We imported last year three times the amount of manufactured cocoa that we did two years before that time, and this increase, I may add, is due I hope to some extent to the fact that people are turning their attention to cocoa, which I believe to be an admirable beverage. Not a little of it is due to the remarkable success of a certain well-advertised article which in gratitude to the maker I am half tempted to name.' Undeniably, Dr. Tibbles' Vi-Cocoa can claim the credit of the reference.

"I do not think we can desire any better testimonial as to the growing demand for cocoa in general, and for Dr. Tibbles' Vi-Cocoa in particular."

COMALTANA WINE

The most NOURISHING & INVIGORATING Wine ever introduced.

COMALTANA is prepared carefully and scientifically from, amongst other ingredients, Coca Leaf, Extract of Malt, and well-matured Port Wine.

Invalids and those suffering from Mental and Bodily Exhaustion find it invaluable.

It is popular among athletes. Gives strength and tone to the system. Lady cyclists especially find it invigorating and a preventive of fatigue.

Price 3s. per Large Bottle.

Sold by Chemists, Wine Merchants, and Stores.

PREPARED ONLY BY THE

COMALTANA WINE CO., Heckmondwike

Sample Bottle sent free to Medical Men on application.

HAY'S FOODS.

HAY'S FRUMENTINE.

TO YOUTHS, ADULTS, and to all who wish to excel in athletic exercises, such as CYCLING, BOATING, CRICKET, FOOTBALL, &c. &c. Try, either in the form of Porridge, or as a thickening for SOUPS, GRAVIES, &c. &c., the delicious and invigorating qualities of HAY'S FRUMENTINE.

HAY'S INFANTS' FOOD

TO EXPECTANT MOTHERS.

It is of the highest importance that, in order to lay the foundation of a vigorous, mental, and bodily constitution in after life the infant should during its Ante-Natal Existence receive the best and most beneficial maternal impressions. The attainment of this desirable object will, therefore, best be accomplished by attention to your own health, moderate exercise, cheerful society proper care of the digestive organs, and by adopting a Porridge diet of HAY'S delicious and LIFE-IMPARTING FRUMENTINE.

HAY'S FRUMENTINE.

TO NURSING MOTHERS who can bring up their children in the natural way,

USE HAY'S FRUMENTINE,

which imparts Life, Stamina, and Nourishment of priceless value to both mother and infant.

PRICE 6D., IN 2 LB. PACKETS.

HAY'S INFANTS' FOOD

TO THOSE MOTHERS less favourably constituted and who desire to feed their Infants on a bone, muscle, and brain-forming Food that will produce

A VIGOROUS GROWTH OF THE BODY GIVEN THEM

HAY'S INFANTS' FOOD,

In Tins, price 8d. and 1s. 3d each.

HIGHEST TESTIMONIALS From all the Medical Journals.

HAY'S HYGEIAN FLOUR MILLS AND FOOD WORKS, HULL, AND

WM. HAY, Limited, Manufacturing Chemists, HULL.

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UNRIVALLED AND UNSURPASSED

THE PIONEER MALT EXTRACT.

PRESCRIBED IN DYSPEPSIA, ANÆMIA, WASTING, BILIOUS, AND NERVOUS, DISEASES.

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HUBBARD'S 50 Years' Reputation

Light, Nourishing, and Attractive

BY ROYAL WARRANT TO HIS MAJESTY THE KING OF ITALY

SCOTCH RUSKS.

Invaluable to Infants and Invalids.

OF GROCERS, CHEMISTS, AND STORES.

WALTER HUBBARD, Partick, GLASGOW.

TRIPLE TEA

IS A PURE TEA,

Being a blend of fine teas from India, China, and Ceylon, and

WE ADVISE YOU TO TRY IT.

It can be obtained direct at the following rates:—

2 lbs. for 3s. 6d.
3 lbs. „ 5s.
4 lbs. „ 6s. 8d.
5 lbs. „ 8s. 4d.
6 lbs. „ 10s.

TRIPLE TEA CO.,

11, Duke Street, Aldgate, LONDON, E.C.

STRICTLY MEDICAL

DR TIBBLES' Vi-Cocoa

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DR TIBBLES' Vi-Cocoa

The "LANCET" says:

"Vi-Cocoa must be assigned a place in the front ranks of really valuable foods, since it is the embodiment of all the numerous principles contained in Malt, Hops, Kola and Cocoa . . . of distinct value as a restorative and stimulative food."

The "BRITISH MEDICAL JOURNAL" says:

"Vi-Cocoa is a very palatable beverage of great stimulating and sustaining properties."

The "MEDICAL MAGAZINE" says:

"Medical practitioners will find a valuable weapon in Dr. Tibbles' Vi-Cocoa in combating the various conditions of nervous exhaustion and enfeebled digestion. The ingredients of which it is composed are carefully selected, and of undoubted strength and purity."

The "POPULAR MEDICAL JOURNAL" says:

Dr. Tibbles' Vi-Cocoa is an excellent combination of Kola and Cocoa; and it not only gives the nutritious and sustaining properties, but, having Hops incorporated with it, acts as a tonic and is soothing, while the addition of Malt neutralises all the starchy matter, and so considerably assists weak digestions."

From EDMUND A. ELLIOTT, M.R.C.S., L.R.C.P.

"I have tried Dr. Tibbles' Vi-Cocoa, and my patients are very pleased with it."

From Dr. T. H. SMITH, Royal Colonial Institute, Northumberland Avenue, W.C.

"I have much pleasure in testifying to the superior qualities of your Vi-Cocoa over any similar preparation in the market. I do this willingly and unsolicited, as I consider it a great boon to the public. I have personally experimented with the cocoas in the market, and find that the great drawback to all of them was the slow process of digestion and assimilation. The diastase in the Malt not only assists digestion in your Vi-Cocoa, but it also accelerates the digestion of other foods that are taken with the Vi-Cocoa. This I have personally tested, and can therefore speak from actual experience. Its wonderful recuperative power after exhaustion from fatigue is marvellous."

Merit, and merit alone, is what is claimed for Dr. Tibbles' Vi-Cocoa, and the proprietors are prepared to send to any reader who names this paper (a postcard will do) a dainty sample tin of Dr. Tibbles' Vi-Cocoa free and post paid.

Dr. Tibbles' Vi-Cocoa, 6d., 9d. and 1s. 6d. Can be obtained from all Grocers, Chemists, and Stores, or from Dr. Tibbles' Vi-Cocoa (Limited), 60, 61 and 62, Bunhill Row, London, E.C.

Coming Municipal Men.

II.—MR. REGINALD BROWN, A.M.I.C.E., *Assistant Surveyor, Ealing.*

MR. REGINALD BROWN, the subject of the present sketch, was born in the ancient city of Peterborough, which contains one of the grandest cathedrals in England, and about which much controversy has recently been waged, owing to the restoration of the noble west front. He was educated in his native city, and on leaving school was placed under the Borough Surveyor, Mr. J. W. Walshaw. This gentleman took a great interest in him, and initiated him into the mysteries of official life, and it is largely owing to the substantial knowledge he gained at Peterborough that he has advanced to his present responsible position. He stayed with the Borough Surveyor of his native town for a period of six years, and during this period large and important municipal works were carried out, amongst which may be especially mentioned extension of main drainage system, paving the streets in the centre of the town with granite cubes, wood, stone, and tar macadam, erection of Cottage Hospital, construction of new roads and private improvement works, and construction of extensive carriers on the sewage irrigation farm of over 300 acres. He had much to do with the management of the office—an essential part of the education of every future municipal engineer—and learnt habits of methodicity which he has not forgotten. Official routine cannot be successfully carried out unless the Surveyor's motto is "Method." Mr. Brown often recalls a splendid motto given to him by the road surveyor or road foreman, viz., "The path of duty is the way of safety," and we would suggest that if every aspirant for municipal honours took this motto to heart, they would find it of some use to them.

MR. REGINALD BROWN, A.M.I.C.E.

In 1890 he was appointed as Assistant Surveyor to the Brentford Local Board, now District Council, his chief being the late respected Mr. J. H. Strachan, A.M.I.C.E. In conjunction with Mr. Strachan, he carried out the erection of a hospital for infectious diseases, and the Board was so pleased with the manner in which the work was carried out that an honorarium of £20 was voted to Mr. Brown as a recognition of his services in connection therewith. He also carried out large works of drainage and private improvements, besides the inspection of all buildings erected under the Building Bye-laws, and the measuring up and certifying the accounts of the various contractors. He also had experience in the working and maintenance of sewage pumping machinery and steam boilers; the treatment of sewage by the "chemical process" with alumino-ferric and lime, and the disposal of the sewage sludge by filter presses, worked by compressed air, the resultant cake being either disposed of by sale, given away, or digging into the surrounding land. Mr. Strachan always spoke very highly of his services. He was awarded the certificate of competency in sanitary knowledge of the Sanitary Institute in 1892.

About six years ago he was appointed to his present position, and during his term of office he has been engaged upon almost every duty which is likely to fall to the lot of a municipal engineer. Ealing is a favourite western suburb of London, and its growth is almost phenomenal. Its population now exceeds 33,000. It is considered one of the healthiest places around London, the death-rate last year being as low as 9·3 per 1000. The engineer's and surveyor's department of a rising town has always plenty to do to keep pace with the requirements of the district. Besides the usual routine inseparable from a public position, he has been engaged upon extensive works of sewerage and storm-water drainage, enlargement of sewage works, enlargement of electric installation buildings, the construction and management of refuse destructors, fixing Galloway and multitubular boilers, erection of hospital lodge, park-keeper's lodge, workmen's cottages, stabling accommodation, public baths; preparation of plans, specifications, and estimates for and superintending the making up of private streets and the apportionment of the expenses thereof; the examination of all plans for new streets and buildings, and the inspection of same during construction; also the drainage of new and old buildings, besides numerous

other works which require attention in a public office. Ealing, as a town, almost stands unique in the possession of municipal buildings. It has magnificent offices, of which any town might well be proud, public swimming baths and slipper baths, the swimming baths being utilised in the winter for gymnastics and other purposes, the swimming space being covered with strongly-constructed and movable wooden floors; large stabling accommodation for the horses belonging to the Authority, and mechanics' shops for the necessary repairs to plant; fire station, sewage farm, sewage-disposal works, electric lighting station, and refuse destructor works, where the sewage sludge is, and has been for years, burnt with the house refuse.

Mr. Brown obtained the certificate of competency to discharge the duties of a Municipal Engineer from the Incorporated Association of Municipal and County Engineers in 1894. This certificate is considered, and rightly too, to be a very valuable one to the younger members of the municipal engineering profession, as the subjects embrace levelling, surveying, hydraulics, sewerage, and sewage disposal works, water supply, road-making, building construction, Building Bye-Laws, Sanitary Science and Municipal and Local Government Law. He was elected a Member of the Sanitary Institute in 1895, and an Associate Member of the Institution of Civil Engineers in 1897. He has also been very successful as a professional coach for the examinations of the Sanitary Institute and the Municipal and County Engineers.

From the above sketch of Mr. Brown's career, it is apparent that he must be the possessor of great energy and perseverance, and when elected to a chieftainship, he will no doubt be able to give a good account of his stewardship. His promotion cannot be far off, as he has already been amongst the finally selected for the Surveyorship to the District Council of Southall-Norwood, Middlesex; the Borough Engineer and Surveyorship of Reigate, Surrey, and quite recently ran very close for the Vestry Surveyorship of Stoke Newington, out of fifty-three candidates.

THE MANCHESTER REPORT ON SYSTEMS OF SEWAGE PURIFICATION.

(Continued from page 508.)

BARKING OUTFALL WORKS.

Chemical Report.—The quantities of lime and iron sulphate (four grains of lime and one grain of sulphate of iron per gallon of sewage) added to the sewage are so small that this can scarcely be called a chemical precipitation. They merely assist clarification and subsidence. The effluent does not comply with the conditions one and three laid down as above.

The results obtained by the use of the coke breeze filter of one acre upon the effluent produced by the above treatment were very satisfactory, as stated by Mr. Dibdin in his printed report, and according to the information received from the officials present. The filter being in course of alteration, our chemist could not take samples. The purification is stated to be 78 per cent. removal of the organic matter, and also that the organic matter remaining in the filtrate "is in such a condition that no signs of after-putrefaction are exhibited however long the filtrate may be kept either diluted or undiluted, in open or closed bottles." The sample of tank effluent before filtration examined by our chemist is worse as regards organic impurities than the effluent from the Davyhulme Works.

Report as to Cost and General Working of Filters.—This filter created a very favourable impression on the deputation on account of the reported efficiency of its working and its apparent freedom from silting up. It is triangular in shape, having the brick structure of a disused culvert on one side, and the river wall on another. These two sides were banked and puddled with clay; the base of the triangle was then constructed with part of the excavated material from the centre, and also puddled with clay. The bed of the filter is a natural formation of peat and peaty clay, and as this material prevents the free passage of water it was found not to be necessary to puddle or concrete it. The bottom is covered to a depth of 3ft. with pan breeze; these cinders were obtained from the gas-works near at hand, at a cost of 3s. 3d. per ton. The proximity of the filtering medium, and the natural preparedness of the bottom and two of the sides of the filter, render it unreliable as a guide to cost for such filters in Manchester. Its area is one acre, and the cost of its construction was £1494 2s. 5d. Messrs. Worth and Crimp, who constructed it; Mr. W. J. Dibdin (late Chemist to the London County Council), who initiated it, and analysed the results of its action; and Mr. Thudichum (the Assistant Chemist), who personally carried out the experiments and measured the quantities, all agree that it is capable of filtering one million gallons of tank effluent per day, and that after five years' working it is free from clogging, and as capable of filtering that quantity as ever. There are reasons to think that the original holding capacity has been somewhat reduced, but its working capacity is not impaired. Its depth is now being doubled, in order to experiment as to whether an increase of power and effect will follow from added depth. Messrs. Worth and Crimp give valuable testimony concerning its power of endurance. They say "that this filter is apparently capable of continuing its function for an indefinite time." Mr. Dibdin affirms "that the lives of such filters are practically without limit." As to maintenance and management, Mr. Dibdin also states that "when such a filter is fairly started, and working systematically, little fear need be felt that it will go wrong; it does not require constant renewal or alteration, but, like a good engine, it wants watchful care to enable it to give the best results." When the power of the filter appears to be diminished, a short period of rest restores it to its original condition.

FRIERN BARNET SEWAGE WORKS.

The deputation visited these works on Wednesday afternoon, the 22nd December, 1897. The visit was not included in the original programme. The Committee were shown over the works by the foreman, and were subsequently met by Mr. E. J. Reynolds, the surveyor to the Friern Barnet Urban District Council, who kindly afforded every assistance and explanation to the Committee, and also supplied the accompanying plan of the works, which are situated on the south side of the district, and within 100 yards of a small brook, into which the effluent flows. The works were completed at the end of 1886. The district has a separate sys-

tem of drains for storm water, and almost all the houses have a dual system of drains. The works comprise three precipitation tanks, each of a capacity of 70,000 gallons. There is a penstock or valve opposite to each tank, so that one or more can be worked at pleasure. Four artificial filter beds are placed below the tanks, having a total area of 6976 yards super. These beds are 6ft. in depth, and are constructed as follows :—2ft. 6in. of coarse burnt clay, 3ft. of fine burnt clay, coke breeze, and sandy soil, mixed in equal proportions, and screened to pass through ¼in. mesh, the top being covered with 6in. of sandy soil. The dry weather flow of sewage is about 220,000 gallons per day, and the population contributing to the works, including Clerkenwell (detached), is about 10,000 persons. The sewage is first screened, and afterwards treated to four grains of Buxton lime per gallon. It is then thoroughly mixed, and receives a dose of one grain per gallon of sulphate of alumina. It is again mixed by passing through a salmon ladder, and in this condition it flows into the precipitation tanks, from whence it overflows through coke screens into an open channel, and thence to the filter beds before described. The filters are worked alternately four days each at a time. At present the filters treat about 126 gallons per super yard per day.

The surface of the filters is occasionally harrowed with hand harrows before the sewage is turned on. The sludge resulting from the precipitation is run by gravitation to a well, from which it is pumped upon the land. Sludge presses were provided, but are not now in use. The original cost of the works, including tanks, filters, and machinery, was £16,000.

Samples of sewage and tank effluent were obtained, and the following is the result of the analysis of same :—

Description of Samples.—Crude sewage, December 22nd, 3.20 p.m.—Considerable amount of brown suspended matter; sample taken shortly after stirring the sewage. Fœtid smell.

Tank Effluent, December 22nd, 3 p.m.—Turbid, with grey suspended matter. Sewage smell.

Filtered Effluent, December 22nd, 3.15.—Bright and clear. No smell.

Analytical Numbers.

Oxygen absorbed, 4 hours.	Grains per gallon.
Sewage (shaken	6·23
„ (settled)	5·28
Tank effluent	2·81
Filtered effluent	·30

Oxygen absorbed, 3 minutes (Incubator Test.)

	Grains per gallons. Before incubator.	After incubator.	Percentage increase.
Sewage (settled)	2·17	5·56	150
Tank effluent	1·27	3·43	170
Filtered effluent	·096	·075	—

Remarks.—Both the sewage and tank effluent become very foul in the incubator. The filtered effluent remains perfectly sweet.

Ammonia— Free and Saline.	Grains per gallon.
Sewage (shaken)	5·30
„ (settled)	5·40
Tank effluent	5·35
Filtered effluent	·025

Albuminoid.

Sewage (shaken)	1·16
„ (settled)	·82
Tank effluent	·56
Filtered effluent	·05

Chlorine—

Sewage	11·0
Tank effluent	7·2
Filtered effluent	7·4

Remarks.—The sewage is of a domestic character. The tank effluent is of a highly putrescible character, containing a large proportion of albuminoids. The filtered effluent is of an excellent quality, showing signs of active nitrification, nitrites being present in it, which are not shown in the tank effluent. The filtered effluent contained nitrogen as nitrates and nitrites to the extent of ·55 grain per gallon. The disappearance of the free ammonia is noteworthy, being due probably to the layer of soil on the filter, such a layer being shown by laboratory experience to be capable of retaining and possibly oxidising the free ammonia. A portion of the soil from the filter was examined, and found to be capable of yielding considerable quantities of albuminoid nitrogen.

Chemical Report.—The real purification is effected by the filter beds, but the sewage being exclusively of a domestic character, and the relative area of the filters to the flow of the sewage so great—namely, equal to about 150,000 gallons per acre per day, passing at the rate of 600,000 gallons per acre—no conclusion can fairly be drawn with the conditions prevailing in Manchester. The analytical figures show, however, what excellent results can be obtained from sewage mainly of a domestic character by the use of an ample area of biological filters.

Report as to Cost and General Working of Filters.—This filter is about 1½ acres in extent, and was built in four sections on sloping ground, which necessitated the building of a deep and strong wall at the end of each section. Its depth is 6ft. and the material is graded—two layers of burnt clay, one of coke breeze, and a top covering of soil 6in. in depth. Its cost was £2847, which is £1898 per acre. It is of larger area than is required at present, and only one section at a time is used. It is now filtering 126 gallons per square yard per twenty-four hours. It was completed in 1886, has worked without needing repair ever since, and is filtering an effluent from very strong domestic sewage.

(*To be continued.*)

TEDDINGTON.—At the last meeting of the Urban District Council a letter was received from the Local Government Board, stating that a complaint had been received from a ratepayer of the non-removal of house refuse. In the course of the reply ordered to be sent, it was stated that the refuse was now collected fortnightly instead of every three weeks as formerly. There were 2270 houses in the district, and complaints were under 2 per cent. One of the members suggested that the Council should adopt the system in force at Broadstairs and Kingston, by which householders put their refuse on to the kerbing every morning in pails, and thus had it removed every day. This, he asserted, would save a great deal of expense to the rates, and prove far more efficacious than the present method.

PRESENTATION.

An interesting gathering took place at the Guildhall, Hereford, on Saturday, when a number of the Corporation officials and friends met to present a testimonial to Mr. James Taylor, who has held the post of Sanitary Inspector for the city for eleven years, and who has resigned his official capacity in order to embark in business on his own account as an architect and sanitary engineer.

The presentation, which consisted of a gold watch and illuminated address, was made by the Town Clerk, who referred in the course of an appropriate speech to the excellent way in which Mr. Taylor had discharged his duties as Sanitary Inspector for the past eleven years.

The address was surmounted by the city arms, and bore views of the Old House and the Cathedral from the river. It was worded in the following terms :—"To Mr. James Taylor : We, the undersigned officials of the Hereford Corporation, ask your acceptance of the accompanying gold watch as a slight token of our esteem and regret upon the occasion of your resigning the position of Inspector of Nuisances for the city of Hereford. During the nearly eleven years that you have held this appointment and it has been our pleasure to associate with you, your unfailing courtesy and tact, accompanied by a conscientious discharge of your duties, have gained for you many friends, and it is with every wish for your future prosperity and happiness in your new sphere of work as an architect and sanitary engineer that we present you with this testimonial.—(Signed) C. B. Beddoe, Clerk of the Peace ; E. Bellerby, City Treasurer ; A. Bellingham, Hospital Matron ; Joseph Carless, Town Clerk ; James Cockcroft, Librarian ; James Davies, Clerk to the Justices ; J. B. Fitzsimons, Hospital Medical Officer ; John Lambe, City Coroner ; H. C. Moore, Assistant Medical Officer ; Daniel Ovens, Market Inspector ; John Parker, City Surveyor ; William Parlby, Gas Manager ; Frank Richardson, Chief Constable ; Richard Rogers, Slaughter-house Manager ; Samuel Rogers, School Attendance Officer ; H. V. Sandford, Medical Officer of Health ; A. B. Smith, Market Collector ; J. A. Spreckley, Surveyor's Accountant." The handsome gold watch bore the following inscription :—"Presented to Mr. James Tayor as a mark of esteem by his co-officials of the Hereford Corporation, March, 1898."

A NEW GAS BURNER FOR STREET AND DOMESTIC LIGHTING.

There is probably no other firm in existence who have done more to extend the value of gas for illuminating purposes, whether for public or private use, than the Incandescent Gas Light Company have done by the introduction and development of the Welsbach burner, which, with its special form of mantle, is superior in efficiency to that of any other gas burner for ordinary use. It will interest many of our readers, however, to know that the company have not been content to rest on their oars, but have still further improved their claim to be the pioneers in the development of gas lighting, by effecting further considerable improvements on the burner used in conjunction with a mantle.

Briefly, it may be stated that the old Welsbach burner had an efficiency of 17 candles per cubic foot on a consumption of 3½ cubic feet of gas per hour, but the new burner is claimed to give an efficiency of 30 candles per cubic foot whether a cubic foot or more is consumed, or with a consumption of 5 cubic feet per hour, such as given by ordinary burners, an illuminating power of 150 candles is produced, so that the efficiency of the new light is claimed to be almost double that of the old. There is also this difference in the new burner, and that is that no chimney is required to be used in conjunction with it.

We have had an opportunity of seeing the new light, and believe that the claim made for it by the company is quite justified, and exceeds the expectations of those engineers who had been apprised some months ago of its proposed introduction. The price of the new burner is to be similar, we understand, to that of the old, so that it behoves our readers who have control of street lighting to withhold the purchase of the old pattern for a few weeks, in order to take advantage of the improvement.

Incidentally, we may also mention that this company have also devoted their attention to improvements in oil lamps by the invention of a special burner with mantle applicable thereto, and have produced a light having an efficiency higher, we believe, for the same amount of consumption of oil than that of any other known type of oil-burner. In smaller towns and villages where gas is not obtainable for street lighting the introduction of this oil-lamp will be, we predict, very popular.

We may add that the new gas burner is to be offered for sale to the public during next month, and we venture to state that it will prove a formidable rival to the electric light. Those of our readers who require to make themselves *au fait* on the subject should communicate with the company, whose offices are in Palmer-street, Westminster, S.W.

ALLOA PUBLIC BATHS.

New public baths have just been erected at Alloa. The building contains the following departments, viz. :—Billiard and amusement-rooms, swimming pond and accessories, first and second-class plunge baths, Turkish baths, Russian bath, and gymnasium. On the ground floor, and immediately on each side of the main entrance, are the billiard and amusement-rooms, and beyond the entrances to these rooms is the booking and towel office. A wide corridor in front of this office gives access to the other departments of the building. The swimming-pond hall, extending from this corridor through a vestibule, is 98ft. by 50ft., having an open timber roof averaging 25ft. high from the floor. The pond is 75ft. by 32ft. On each side are dressing boxes. A dressing-room and washing-room for school children are provided at the entrance end, and a washing-room for adults, with the usual conveniences, is situated close to the club-room. The second-class plunge baths—seven in number, on a slightly lower level than the pond—are entered from the main corridor. The first-class baths are on an entresol floor immediately over the booking office, and are reached from the same corridor by a stair. The Turkish bath department, and the Russian bath adjoining, are at the far end of the swimming pond. The gymnasium, 76ft. by 28ft., having an open timber roof, with an average height of 22ft.,

occupies the whole of the first floor of the front building over the billiard and amusement-rooms, and is provided with the necessary dressing-rooms. A gallery is placed at the one end. The washing-house and laundry are placed behind the heating department. All the rooms have been fitted with lamps for electric lighting; this work has been carried out by Messrs. Mavor and Coulson, Limited, Glasgow. Messrs. Burnet, Son, and Campbell, of Glasgow, were the architects.

ADULTERATION IN MIDDLESEX.

FROM a return presented to the Middlesex County Council of the working of the Food and Drugs Act for the year ended March last it appears that 1844 samples of various articles were analysed during the year, of which only 87 were found adulterated, making a percentage of 4·6, as against 7·8 for the preceding year in Middlesex. The percentage throughout the country is 9·2. On this point it may be remarked that the percentage system is very misleading in some respects. For instance, salad oil is credited with 100 per cent. adulteration, the fact being that only one sample was taken, and that found impure. Similarly separated milk figures at 50 per cent., *i.e.*, two samples were taken and one found bad; and all will be interested to learn that though rhubarb pills have a report of 66·6 adulteration in Middlesex, there were only three samples, taken and one found wrong.

As usual the milk vendors came in for a large share of attention, 972 samples of the genuine article having been taken, of which fifty-two were found incorrect. Butter fared better, half that number being taken and only sixteen found adulterated. Beer comes out with a clean sheet, by reason probably of the fact that no one in authority is able to state what beer is. But brandy shows 50 per cent. adulteration, gin 25 per cent., rum 100 per cent., and whisky only 9·1. Rum evidently wants looking up again. The rising generation will learn with delight that liquorice, ginger bread, ginger beer, cocoa-nut chips, saveloys, and castor oil have all been found the pink of perfection. And Dr. Tibbles, whose name has been prominently before the public of late, will be pleased to learn that his Vi-Cocoa has passed through the analyst's crucible and stood the test with credit to itself and its maker's reputation.

Our old friend, hokey pokey, too, has secured a certificate, and, if not pleasant, may be held to be inocuous if taken in moderation. The cost of all this examination and analysis was £1588 3s. 4d., of which the analyst took £1073 2s. in fees, leaving the surplus to the smaller fry; £154 3s. 6d. was received back in the shape of fines from offenders, of whom 93 suffered out of 121 prosecuted. In the western district of Middlesex, where the energetic Mr. Walter H. Tyler holds sway, 124 samples were taken during the past year, of which seven were found adulterated and two inferior. Mr. Tyler took brandy and whisky for analysis, and it must be recorded that some of it was found bad. He also took milk to the extent of 62 samples, of which two were found adulterated.

THE SANITARY INSTITUTE.

At an examination in Practical Sanitary Science, held in London on May 6th and 7th, twelve candidates presented themselves. The following five candidates were granted certificates in Practical Sanitary Science:—A. S. E. Ackermann, H. Bates, W. C. Henley, J. Hipkin, G. T. I. Oliver.

At an examination for Inspectors of Nuisances, held in London on May 6th and 7th, 109 candidates presented themselves. The following 64 candidates were certified, as regards their sanitary knowledge, competent to discharge the duties of Inspectors of Nuisances:—

D. Bagshaw, W. Barker, W. J. Bates, G. Best, H. E. Brown, T. L. Burrell.

H. Callow, Miss E. H. Cordner.

G. E. J. Davis, S. N. Davy, J. E. Dowell, H. L. Dunkin. E. H. Faragher, E. Few.

E. D. Gedge, W. H. S. Gowen, W. J. Griggs, F. A. Gwillim.

H. R. Hardy, W. Hawke, T. W. Hull, H. L. Hyde. I. R. Jones, W. D. Jones, W. P. Jones.

A. E. Lang, A. J. Lester, C. M. Longden, P. W. Luke.

Miss A. Malone, S. S. Markham, Miss E. L. Maynard, S. J. Maynard, F. W. Melhuish, M.R.C.V.S., Miss C. Mennell, G. Mitchell.

Miss C. A. Nevile, E. A. Norman.

J. H. Pearson, Miss M. E. Piggott, Miss K. A. Platt, W. C. Portman, A. G. Potter, J. J. Pratt.

A. S. Quelch.

J. H. Reynolds, A. M. Robertson.

E. W. Sandford, E. E. Scott, Miss E. Stewart.

H. Taviner, C. R. Thomas, H. J. Toogood, H. S. Toogood, Mrs. E. C. Townsend, T. Tribe.

G. S. Walker, G. R. Weeks, J. Wells, J. West, T. W. Williams, C. N. Wilson, Miss T. F. Wilson, I. Worrow.

Improvement in Incandescent Light.—Although the superiority of the incandescent gaslight, both from an economical point of view and as an illuminant, over the ordinary gas jet is generally recognised, the fragile character of the incandescent mantles has hitherto proved a serious obstacle to the adoption of the incandescent system of gas-lighting in works or other situations subject to more than ordinary vibration. By a very simple device, which has been designed and patented by Mr. W. R. Clay, of Bolton, this serious objection to the use of the incandescent gaslight in engineering and other works is said to have been practically overcome, as by this arrangement the effect of shock or vibration upon the mantles of incandescent gas burners is altogether neutralised. The invention is quite novel, and consists simply in coiling a portion of the pipe supplying gas to the burner in such a manner as to form a resilient spring—an adaptation of the gas pipe that has never before been attempted. The usefulness of the arrangement will be apparent when it is stated that with a copper pipe coiled as above described, gas burners can be used in any situation, and the mantles preserved to more than their average length of life. Another special point is that as no india-rubber is used in its construction, the fitting does not come under the ban placed by the fire insurance companies upon anti-vibratory fittings other than those made entirely of metal.

Sanitary Inspectors' Associations.

YORKSHIRE.

THE members of this branch of the Sanitary Inspectors' Association met on Saturday afternoon in the Council Chamber of the Leeds Town Hall, Mr. D. Travis presiding. Dr. J. Spottiswoode Cameron delivered a lecture on "The Economic Measure of Sanitary Progress in Terms of Lives Lengthened during Years of Robust Manhood." Statistics, he said, proved that the child born in England had an expectation of forty-one years of life; the French child's expectation was forty years, and the child born in Sweden thirty-nine years. Figures showing the number of persons per 1000 of the population who died in various localities per annum could not be taken as a perfect criterion of the sanitary condition of such locality. If an exceptional proportion of the people in a certain place were between the ages of, say, sixteen and fifty, the death-rate in such a place ought to be less than amongst a population largely composed of young children and old people. The death-rate was higher in manufacturing towns than in rural districts. Taking a recent period, the Registrar-General's returns showed the death-rate in England and Wales to have been 19·1 per 1000 per annum. In the twenty-eight largest towns during this period the death-rate was over 21, whilst in rural districts it was only 17·6. Small-pox, measles, and scarlet fever were more fatal in towns than the country. There was not the same difference, however, in regard to typhoid, which depended so much on the quality of drinking water and milk supply. Although our towns were becoming more crowded every year, and although the average acreage of land per man in the country was gradually diminishing, yet the lives of the people were being more effectively preserved. Whilst the death-rate amongst old people was increasing, there were more people who lived to be old than was formerly the case. In other words, the death-rate amongst the young and middle-aged was gradually diminishing. Fewer deaths occurred to-day from consumption. The decline in this disease in women was particularly marked. This was no doubt due to the improved sanitary conditions of the homes of this country. The mortality tables showed a steady increase in the number of survivors at mature ages. A youth of twenty some forty years ago had an expectation of twenty years of further life, and a maiden of twenty-one years. These had now been increased to twenty-three and twenty-five years. The lives of weak people had been prolonged, and fewer people died in middle age. Improved sanitation had brought this very desirable change about.

A discussion followed, in which Mr. LINDLEY, Batley; Mr. DARLEY, Leeds; Mr. DENHAM, Tadcaster; and others took part.

A hearty vote of thanks to Dr. Cameron concluded the proceedings.

BARMOUTH.—The waterworks, which have been carried out at a cost of nearly £28,000, are now completed, and the formal opening will take place on Saturday, June 11th. The ceremony was to be performed by Mr. T. W. Russell, M.P., last week.

General News.

BRIGHTLINGSEA.—The Urban District Council is applying for sanction to purchase the local waterworks at a cost of £4500.

PUDSEY.—At a recent meeting of the Urban District Council, sketch plans for public baths, estimated to cost £4000, were considered, but it was decided that the present time was inopportune for such an outlay, and the whole project dropped.

ILFORD.—A Local Government Board inquiry has been held in reference to the Urban District Council's application for sanction to borrow £12,350 for public street improvements and surface water drainage; £1385 for private street improvements; and £700 for an underground convenience in the Broadway.

EAST SUSSEX.—The County Council has decided to appoint a Sub-Committee of the Sanitary Committee to consider what steps it is desirable to take in order to secure the provision of hospitals for infectious diseases throughout the administrative county, with authority to communicate and confer with the District Councils on the subject.

KEIGHLEY.—The Council has agreed to exercise the clause of the local Bill as to the closing of existing registered slaughter-houses, and providing compensation therefor, the reason given for this step being that the Tuberculosis Commission had reported in favour of increased powers being granted Local Authorities in this behalf.

LEITH.—The deaths registered within the burgh during the month of April numbered 119, being a decrease of 18 on the preceding month, and a decrease of 9 on the corresponding month last year, and showing a death-rate of 18·9 per 1000. Infectious disease accounted for 5 deaths, viz., small-pox, 1; scarlet fever, 1; diphtheria, 1, erysipelas, 2.

RICHMOND (SURREY).—The Town Council has unanimously passed a resolution in opposition to the proposed light railway from Kew to Hampton Court. A special meeting was held to consider the matter. There have also been meetings of the Richmond Select Vestry and tradesmen's organisations, all of which have decided to join in opposing the scheme.

KNARESBOROUGH.—The Sanitary Committee has been authorised to hold a local inquiry into the necessity for the establishment of an isolation hospital or hospitals for the use of the inhabitants of Knaresborough urban and rural districts. The Harrogate Corporation has expressed willingness to consider a scheme for combining with Knaresborough.

LANCASTER.—Dr. Parker, Medical Officer for the Lancaster Rural District Council, in his annual report, expresses pleasure that several matters which have long required attention are receiving consideration:—The provision of hospital accommodation for infectious diseases, the water supply of portions of the district, and the visitation of notified cases of infectious disease. The appointment of an assistant Sanitary Inspector is urgently required. Regulations under the Local Government Board Order have been adopted for dairies, cowsheds, &c. The time is ripe, he declares, for the legislative regulation of traffic in milk and flesh.

KELSO.—The Heatherhope water scheme has been postponed.

REDCAR.—New water mains are to be laid in a portion of High-street, at a cost of £72.

HALIFAX.—The Town Council has resolved to expend the sum of £250 on waterworks.

DONCASTER.—The Corporation hopes shortly to complete a satisfactory scheme for small-pox patients.

SUNDERLAND.—The surveyor has been instructed to prepare plans for a hospital at as early a date as possible.

BIRMINGHAM.—At a recent meeting of the Birmingham Association of Mechanical Engineers, Mr. E. A. Lees delivered his illustrated lecture on "The Welsh Water Scheme." The lucid explanation of the enterprise, and the numerous interesting particulars furnished by Mr. Lees, were much appreciated, and a hearty vote of thanks was accorded to him.

BELFAST.—A deputation from Belfast, consisting of Councillor Corr, Mr. F. C. Johnston, Mr. F. Robinson (Deputy Clerk to the markets), and Mr. J. Munce (Engineer to the Belfast Corporation), have been in England and Scotland recently, inspecting the public abattoirs. This visit of the deputation is in view of the large additions to the abattoirs which have been authorised by the Belfast Corporation.

DEVONPORT.—The Borough Council has referred to a Committee an offer which it has received to provide the town with one of Willoughby's refuse destructors, capable of dealing with from 70 to 100 tons of refuse per day, the Council to work the destructor for three months, and if it approved of it at the end of that time to purchase it for £2000. If the Council did not approve of the destructor it would be removed, and no claim made on the Council. The destructor could also be used for stonebreaking and for a supply of steam to a disinfectant apparatus.

EDMONTON.—Dr. Green, the Medical Officer of Health, in his annual report to the Urban District Council, again refers to the need for an isolation hospital:—"The need of adequate provision is felt every year, and the cost and difficulty of providing it will, I fear, increase with delay. During the year to which this report relates, the want of such provision was most keenly felt in dealing with the outbreak of diphtheria, there being absolutely no accommodation at the disposal of the Council."

HAMPTON.—At the last meeting of the Urban District Council the Medical Officer reported that he had examined five samples of well water, all of which were found to be bad and unfit for domestic use. Accompanied by the Inspector he had visited the dairies, cowsheds, slaughter-houses, and bakehouses in the district. He had reason to find fault in some instances, but he had since learnt that the defects had been made good. Numerous complaints, written and oral, had come to his knowledge as to the excessive amount of dense smoke emitted from the shafts of the water companies during the past month. The Inspector was taking notes of the occasions when this happened. It was resolved to serve the necessary notices on the companies to abate the nuisance. With the exception of a few cases of measles there was no notifiable disease in the district.

LOUGHBOROUGH.—A loan of £3000 is to be raised to meet the cost of a new filter, extension of mains, &c.

CASTLEFORD.—A special Committee has been appointed to give their immediate attention to the question of water storage.

LLANELLY.—The Borough Council has purchased certain lands at Ystradfai and Pandyfach required for the new waterworks, at over £2000.

MANCHESTER.—In reference to a statement which appeared in last week's issue that no cases of small-pox has been reported in Manchester for a little over a year, Mr. Geo. A. Stephenson writes:—"If you refer to the Manchester weekly health return for the week ending May 7th, 1898, you will find that no cases have been reported in Manchester since May, 1896."

Personal.

MR. H. R. BROWN has been appointed Medical Officer of Health for the borough of Maldon.

MR. R. BROWN has been appointed Medical Officer for the first district of Hackney union.

MR. W. H. COOPER has been appointed Medical Officer for the Stavely district of Kendal union.

MR. E. J. LEGG has been appointed Inspector of Nuisances for the borough of Christchurch.

DR. BURGESS has been reappointed Medical Officer for Hoole, at a salary of £35 per annum.

MR. D. FRASER has been appointed Medical Officer of Heath for the urban district of Buckley.

MR. G. B. SIMPSON has been appointed Medical Officer for the Lastingham district of Pickering union.

DR. R. J. SPEAKELING has been reappointed Medical Officer of Health for the borough of Bootle.

DR. C. J. VLIELAND has been appointed Medical Officer of Health for the urban district of St. Thomas.

MR. WM. OXTOBY, A.M.I.C.E., Poplar, has been appointed Surveyor for the Vestry of Camberwell.

MR. W. T. WOOLDRIDGE has been appointed Inspector of Nuisances for the rural district of Epsom.

MR. G. C. H. FULTON has been appointed Medical Officer of Health for the urban district of Eston.

MR. E. E. LLOYD has been appointed junior-assistant Medical Officer at the Fulham union infirmary.

MR. G. COLE has been appointed Medical Officer for the sixth district of the parish of Nottingham.

MR. ARTHUR F. TURNER has been appointed Medical Officer of Health for the borough of Tewkesbury.

DR. ARTHUR NEWSHOLME, Brighton Medical Officer of Health, has been invited to become one of the Examiners in Preventive Medicine at Oxford University. The examination is held once a year, in November, and lasts about two days.

MR. G. B. HILLMAN has been appointed Medical Officer of Health for the urban district of Whitwood.

MR. J. W. ROWLEY has been appointed Inspector of Nuisances for the urban district of Ashley Woulds.

MR. J. F. LAMB, of the Engineer-in-Chief's office of the General Post-office, has been elected an Associate of the Institution of Electrical Engineers.

MISS ALICE TREBAY has been appointed female Sanitary Inspector for the Hackney Vestry. This lady received her training at the National Health Society, and holds its diploma.

THE Local Government Board has sanctioned the appointment of Dr. W. Monckton as Medical Officer of Health, and of Mr. Moss Flower as Surveyor and Inspector for the district of Portishead.

MR. T. FENN, who for four years held the position of Surveyor and Inspector of Nuisances under the Soothill Upper District Council, has secured an appointment as Surveyor to the Belper District Council.

MR. ISAAC SMITH, for eighteen years Inspector of Nuisances for the borough of Lancaster, died at his residence on the 8th inst. Deceased retired from public life two years ago on account of ill-health. He was sixty-one years of age.

MR. WILLIAM LINDLEY CATLIN, M.W.W.A., late Clerk of Works of the Haverhill (Suffolk) Waterworks, has been appointed Engineer and Manager of the Faversham Water Company, Limited, in place of Mr. R. Dauney, resigned.

AT the recent London examination of the Municipal and County Engineers' Association, we are pleased to find among the successful candidates our old contributor, Mr. Ernest Worrall, now located as Surveyor to the Local Authority at Penmaenmawr, North Wales. We congratulate Mr. Worrall on his success.

MR. J. CORBEN, Sanitary Superintendent to the Corporation of the city of Cape Town, having received four months' leave of absence, is on his way for a visit to the old country. He has been in South Africa over six years; prior to his present appointment he was the Chief Sanitary Inspector at Southampton, at which place he will see a marvellous change upon his return.

Sewerage Schemes.

[TO MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

THE Urban District Council of Portslade (Sussex) has decided to apply to the Local Government Board for sanction to borrow £19,500 for the drainage of the district.

THE Waterford Corporation has, we understand, adopted a city sewerage scheme at a cost of £40,000. The tender of Mr. Smith, of Belfast, for £10,000 for portion has been accepted.

A SUB-COMMITTEE of the Sanitary Committee of Stoke-on-Trent Town Council has been appointed to consider whether it is desirable to deal with the Trent Vale sewage in any other way than at present.

CARLISLE Town Council has decided to adopt a bacteriological filter on the Dibdin system for the sewage disposal of the city, and the Surveyor (Mr. Henry C. Marks) is to prepare plans for the necessary plant.

A LOCAL Government Board inquiry has been held at Cossal into the application of the Rural District Council of Basford for sanction to borrow £2300 for the purposes of sewerage and sewage disposal for the parish of Cossal.

THE Local Government Board has written the Portishead District Council with reference to the application of the Council to borrow £3000 for the purposes of sewerage, stating that before deciding upon the application the Board would direct a local inquiry on the subject.

PLANS of a new scheme of sewerage for the drainage of Dorchester (where the Frome is being polluted), on which so much depends for the effective treatment of extensive suburban districts, are about to be submitted to the Corporation. These out districts will then be, in all probability, taken in the borough.

THE Thorpe-le-Soken Parish Council recently had before it a new system of sewerage for the parish, prepared by Mr. T. H. Gold, surveyor to the Tendring Rural District Council. The Essex County Council is about to make up the main road through the parish, and wishes to have the drainage done first. Mr. Gold's estimate of the cost of his proposal is £750.

AT the Manchester County Police-court, on Thursday, the 12th inst., Mr. Yates, Q.C., the stipendiary magistrate, refused to sanction the application of the Manchester Corporation for a further extension of time to enable it to carry out the order made by the Court in September, 1896, for the completion of the sewage works.

THE Native Guano Company is endeavouring to comply with the new rules of the Thames Conservancy Board and produce a better effluent at the Kingston works. By way of experiment the company has recently constructed a small coke filter, the effect of which is considered so satisfactory that the directors have decided to construct two others on a larger scale, each 20ft. by 11ft. The one will be filled with panned breeze, *i.e.*, actual ashes, as a filtering medium, and the other with coke breeze, *i.e.*, made-up coke, so as to compare the results. It has been found that in the effluent passed through the small experimental filter already mentioned the amount of ammonia albuminoid was reduced by one-half. Even better results are anticipated from the larger filters. Similar filters are used at the Aylesbury works.

THE Local Government Board has sanctioned a loan to the Tring Urban District Council of £5000 for sewerage and sewage disposal works.

THE Woolwich Local Board has decided to support the application of the Lee District Board for the construction of a proper system of main drainage for Charlton on the north side of the Woolwich-road.

THE Town Council of Canterbury has adopted reports recommending application to the Local Government Board for £20,000 for sewerage improvements, £3000 for works at the sanatorium, and £1000 for the erection of workmen's cottages at the sewage farm.

THE ceremony of cutting the first sod in connection with the new drainage scheme to be carried out at Popesdown, a suburb of Bournemouth, took place on Thursday afternoon, the 12th inst. The works are to cost about £20,000, and the ceremony was performed by Mr. W. Bolton, ex-chairman of the Urban District Council. A public luncheon followed.

AT the last meeting of the Enderby Sanitary Authority a communication from the Local Government Board in reference to the proposed sewerage scheme, and the desire of the Local Authority to adopt the Birches system of sewage disposal, was well discussed, and eventually a deputation, consisting of Messrs. W. H. Key, W. Young, T. Salt, and G. Gilliver, was appointed to visit and inspect the sewage works at Birstall, Yorkshire, where the Birches system has been in operation for about three years. Mr. W. Battersby, a member of the Sanitary Authority, who had previously reported on a visit to the works in question, will accompany the deputation.

A LOCAL Government Board inquiry has been held at Caerphilly with reference to the proposed scheme of the Urban District Council for the drainage of Caerphilly, Llanbradach, Aber, and Senghenydd, in respect of which it was proposed to borrow £36,000. The district proposed to be drained under this scheme is about 17,000 acres, and the scheme is in two sections, viz, the Rhymney Valley and the Aber Valley. Future requirements were looked to in the arrangement of the scheme. Both mains would fall into a farm called Gwain-y-Bara, in the hamlet of Van, about a mile from Rudry. This farm had been purchased under a Provisional Order, and the sewage disposal scheme adopted was the intermittent and broad irrigation system. The present state of affairs in the four centres proposed to be drained was very serious. At Llanbradach and Caerphilly and in the Aber Valley houses were drained into cesspools, and the whole was eventually drained into the Aber Stream and Rhymney River, causing most serious and scandalous pollution. The Council had passed plans for over 2000 houses to be built in about two years, and the new colliery districts were increasing month by month, so that the Council felt it was a necessity to adopt some such scheme as would cope with the future development of the various centres in the districts.

ON Friday, May 13th, Major-General H. D. Crozier, R.E., an Inspector of the Local Government Board, attended at the Hampton District Council offices to inquire into the application of the Council for power to borrow the sum of £6000 for purposes of sewerage and sewage disposal. The Surveyor showed how the amount was made up, viz., by an additional ejector station, and various works connected therewith. The additional ejector was rendered necessary on account of the difficulty of making a sewer from three houses on the Hampton Court-road, where the large mains of the water companies would necessitate the sewers being laid at a great depth. In the course of the inquiry, which lasted nearly three hours, and in which the minutest details were entered into, the Inspector said it seemed to him that the Committee with a very light heart spent £6000 more than their estimate. In his opinion a fuller explanation was necessary before official sanction was given. Mr. Kemp said he had not prepared the estimate, and it was a very difficult district to estimate for. The Inspector said there was then all the more reason why an amount for contingencies should have been included. He was quite tired of these excesses of estimates in various parts of the country. He considered that Mr. Shone, who was largely responsible for the scheme, ought to have been present.

Lighting.

THE Urban District Council of Prestwich has decided to advertise its intention to apply for a Provisional Order for the electric lighting of the district.

IT is under contemplation by the Director-General of Telegraphs to apply to the Government of India for sanction to appoint an Inspector of Electricity for the city of Madras.

THE Ossett Town Council has decided to visit and inspect the electric lighting plant and refuse destructor at Shoreditch, with a view to ascertaining the practicability of combining the two objects in Ossett.

THE St. Annes-on-Sea Gas Bill, which had already passed the Commons, has gone through a Committee of the Lords unopposed. The Bill provides for the incorporation of the gas company with a capital of £45,000.

AT a recent meeting of the Gas Committee of the Aberdeen Town Council tenders for laying an electric cable for the harbour and west end of the city were opened. The offer of Messrs. Siemens Brothers, amounting to £12,138, was accepted.

THE Hampstead Vestry has just completed the electric lighting by arc lamps of Haverstock-hill and High-street, Hampstead, and as the St. Pancras Vestry has also completed its installation from Oxford-street to Haverstock-hill, there is now an unbroken line of public municipal lamps from Oxford-street to Heath-street, Hampstead.

THE Waterloo District Council has sealed the contract with Messrs. Wareing and Gillow, Limited, of Liverpool, for an electric light installation at the Town Hall.

THE Town Council of Port Glasgow has agreed to accept the offer of Messrs. Hanna, Donald, and Wilson for the extension of the gasworks. The work is estimated to cost over £1000.

AT a recent meeting of the Buckie Police Commissioners it was recommended by the Gas Committee that the Commissioners light the burgh of Portsoy with acetylene gas. This resolution was adopted. Portsoy is the first place in Scotland to adopt the new light.

THE Committee of Selection in the House of Lords has appointed the following peers to consider the Filey Water and Gas Bill among other private Bills. The Earl of Kintore (chairman), Lord Zouche of Haryngworth, Lord de Mauley, Lord Wolverton, and the Earl of Normanton.

THE negotiations between the General Purposes Committee of the Birmingham City Council and the Birmingham Electric Supply Company for the purchase of the concern by the municipality have resulted in a provisional agreement to be submitted to the Council and the company's shareholders. The terms are on the basis of £10 10s. per £5 share, which represents about their Stock Exchange value on the basis of the 5 per cent. dividend paid last year. The authorised capital of the company is £200,000 in £5 shares, and at the last valuation the total assets were set down at £244,504. Among the public buildings supplied by the company with electric light are the Market Hall, the Town Hall, the Victoria Courts, and the new General Hospital.

THE ordinary general meeting of the Bombay Gas Company, Limited, was held recently at the Offices, Drapers' Gardens. Mr. Robert Davidson presided, and in moving the adoption of the report, stated that throughout 1897 all the public lamps were lighted on the incandescent system, and had given the greatest satisfaction to the municipality and the public. There had been a diminution in the receipts from public lighting in the year amounting to £5015, and the falling off in the receipts from private lighting had been £3834. In the latter part of the year, however, the company was making progress in regard to the private lighting. They had anticipated a decrease in the revenue from public lighting, owing to the cost of maintaining the Welsbach mantles, but they had also expected an increase in the private lighting, and had hoped that the one would meet the other. That, however, had not been the case in consequence of the continued prevalence of the plague, which had disastrously affected the condition and industries of Bombay, causing a considerable falling off in the consumption of gas for private consumers. They proposed to pay a further dividend of 3 per cent., making 6 per cent. for the year, and to do this they had taken £1255 from the reserve fund, which had been accumulating for many years. The motion was seconded and adopted.

THE Tottenham Urban District Council has received a communication from the Local Government Board stating that, owing to varying opinions on the subject of the danger accruing from the manufacture and supply of water gas, a departmental inquiry was to be held, and this Council was asked to send a representative to afford any information on the subjec possible.

AT a recent meeting of the Electric Lighting Committee of the City Corporation of Leeds, the Chairman (Mr. Skinner) submitted the statement of the working of the installation in the city during the past year. The Committee commenced the year just ended with the carrying out of a large extension of the electric system to the west and north of the port, estimated to cost £40,690. These works were now well in hand, the buildings were near completion, and the equipment was being carried on with despatch. The total expenditure on capital account was now £61,738, of which £14,153 had been spent during the year. The total revenue was £10,453; expenditure, £5450; balance, £5003. The interest on loans amounted to £1496; contributions to sinking fund, £1467; leaving a net profit on the year's working, £2040. The increasing demands being made for current, even at this season of the year, and the pledge made to the residents in East Hull, rendered it necessary that the Committee should take in hand very shortly a further extension. The report, which was considered very satisfactory, was unanimously adopted.

THE Special Sub-committee of the Birkenhead Gas, Water, and Electrical Committee, appointed to report upon the manufacture and supply of carburetted water gas by the Corporation, now report that investigations have been made by the borough gas engineer, Mr. T. O. Paterson, M. Inst. C.E., with the result that of the 241 persons who petitioned the Council, complaining of badly-lighted houses and streets, and noxious smells, and alleging serious injury to health from the gas supply, 177 replied to a circular requesting a definite complaint. In 129 cases a special inspection was made, and in 38 cases the defect was remedied, 51 were satisfied without anything being done, and 30 persons remain dissatisfied. Statistics are given showing that the average illuminating power of the gas during the year was higher than the preceding four years, when water gas was not mixed with the coal gas. The report also states that the number of complaints fell from 3914 in 1896 to 1539 last year, and police complaints of street lamps were likewise reduced in a marked degree, while the utter absence now of naphthaline deposits in the services has removed a fruitful cause of complaint. As to the bad smells alleged, the Committee state that every precaution is taken to prevent the emission of bad smells at the works, and quote from a special report by Sir Henry Roscoe, "The products of combustion of carburetted water gas are not more injurious to health than are those of coal gas;" and a somewhat similar opinion given by Professor Lewis, F.I.C. If the same care and attention were paid to pipes and fittings as has been given when coal gas only was supplied, there can be no reasonable or valid objection to the supply and use of their new gas.

Notes and Queries.

Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C.

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

1079. — FORMALIN DISINFECTANT FOR ROOMS.—"Sanitas Sanitatum" writes:—"May I trouble you for information as to the disinfectant called 'Formalin,' as to its chemical characteristics, mode of manufacture, and effects?"

Answer.—The disinfectant "Formalin" is a powerful one, and is described as a preservative and deodorising liquid of 40 per cent. Formic Aldehyde. Technically, an aldehyde is an alcohol de-hydrogenated, and, as a rule, an alcohol is transformed into aldehyde when it loses two atoms of its hydrogen. Thus, wood spirit (methyl alcohol) (CH_3OH), when deprived of H_2, becomes CHOH, called formic aldehyde, because it very readily changes to formic acid (CHOOH). The aldehyde vapours are irritating to the eyes and throat, and are a most effective disinfectant for the surface disinfection of rooms. Dr. Kenwood, Assistant-Professor of Public Health, University College, London, who has carried out numerous experiments to test its efficacy, states that the following conclusions are amply warranted:—(1) That when the atmosphere is charged with less than 1 per cent. of the vapour, the disinfection of all surfaces is complete and rapid. (2) That the vapours possess a certain and variable amount of penetrating power into loose fabrics, especially when these are dry. (This has been proved by numerous independent workers). (3) That the vapours do not affect the colours of textile materials nor (with the exception of iron or steel) metallic surfaces. (4) That the rooms and articles exposed can be cleared of the vapours readily by sufficient aëration, and the vapours are not so irritating, but one can always enter the room and unseal at the first attempt. (5) That the disinfecting properties of the aldehyde are greater than those of sulphurous acid or chlorine. (6) That there is no danger in entering the room, either from the aldehyde or from the CO, which is formed at the same time. The aldehyde is generated by a lamp, specially devised for the purpose, illustrations of which are furnished by the patentees, the Formalin Hygienic Company, Ltd., 9 and 10, St. Mary-at-Hill, London, E.C. Our correspondent should obtain Dr. Rideal's excellent book, "Disinfection and Disinfectants," price 12s. 6d. (or if subscription copy is obtained, 10s.), as to which see advertisement in our pages.

1080.—NUMBERING HOUSES AND NAMING STREETS IN RURAL DISTRICTS.—"J. G." writes:—"In several of the larger villages in this rural sanitary district considerable inconvenience is caused by reason of the houses not being numbered, nor the streets named. What steps can be taken by the Rural Council to obtain powers to do the work?"

Answer.—By Section 25 (5) of the Local Government Act, 1894, Rural District Councils are to have such powers, duties, and liabilities of Urban Sanitary Authorities under the Public Health Acts, as the Local Government Board may by order direct. Sec. 160 of the Public Health Act, 1875, confers upon Urban Authorities the power to name streets and number houses, as prescribed by Secs. 54 and 55 of the Towns Improvement Clauses Act, 1847. The Authority may cause to be put up or painted on a conspicuous part of any house, building, or place near or at the end of every street, the name by which such street is to be known, and they may require the occupiers of houses to mark their houses with such numbers as the Authority approve of, and to renew them as often as they become obliterated or defaced.

1081.—DISINFECTANT FOR FLUSHING DRAINS.—"F. W. S." writes:—"I am about to engage a man to daily disinfect the drains of houses where infectious disease exists. Will you please tell me the best disinfectant for the purpose? I had thought of perchloride of mercury. If that, what is the best mixture to make?"

Answer.—We are of opinion that good results will be obtained by using almost any disinfectant if manufactured by a firm of repute. A reference to our advertising pages will give the names of some reliable firms; and if their instructions be followed as to the method and proportions of the mixture, which should be obtained from them, satisfactory results may with confidence be apprehended. If it be desired to use perchloride of mercury (corrosive sublimate), we should advise that it be obtained in block form, as manufactured by the St. Bede Chemical Company, Limited, Newcastle-on-Tyne. This company make it up in small blocks, costing about 3d. each, which are dissolved in either hot or cold water, and which give about one quart of strong disinfectant. In this form it is convenient and safer to use than is otherwise the case.

1082.—FOOTPATH: STILE DEFECTIVE.—"Surveyor" writes:—"In a parish in a rural district there is a stile across a footpath which is in a bad state of repair and dangerous for foot-passengers. Notices have been served on the owner and occupier to repair it, but neither of them take any notice. Will you please advise what steps we can take in the matter?"

Answer.—If a person while passing over the stile were to receive an injury owing to the dangerous condition or non-repair of the said stile, the person whose duty it is to repair the stile would be liable. The District Council as the Highway Authority may remove the stile or institute proceedings against the occupier as for a nuisance. The Parish Council may, however, undertake its repair and maintenance under Sec. 13, Sub.-sec. 2, of the Local Government Act, 1894.

1083. — DISINFECTANT FOR STREET WATERING RECOMMENDED.—"Surveyor" writes:—"It is desired to use a disinfectant which may be mixed with the water in the street-watering vans so as to disinfect the roads and streets, which is, it is considered, a sanitary measure, and carried out in many towns. Will you please advise me as to the most convenient method in which the disinfectant may be applied?"

Answer.—We are informed by those who have practical experience in the superintendence of street watering that the disinfectants described as Carberzone and Pynerzone, and manufactured by Messrs. Hope and Sons, Oaklane Chemical Works, Limehouse, London, E., are probably the most convenient and popular disinfectants in use for street watering. They are both put up in the form of soluble blocks, weighing about 3 lb. each. One of the blocks is placed in the watering van, and gradually dissolving, is sufficient to disinfect about eighteen van loads of water, and will last a whole day. Pynerzone is claimed to be a complete disinfectant, being an extract of pine, eucalyptus, and purified thymol; and Carberzone is an extract of carbolic acid, cresylic acid, and naphthaline. A result of using these disinfectants is that a very agreeable, fresh, and healthy odour is given to the atmosphere of the streets. The blocks are comparatively inexpensive, twenty-five of them costing about £1 15s. This system of disinfecting the roads is a commendable one.

1084.—CONSTRUCTING NEW BAY WINDOW: CONSENT OF URBAN AUTHORITY NECESSARY.—"G. H." writes:—

"Can the owner of a building bring out a bay window beyond the front main wall of his house without obtaining the consent of the Urban Authority?"

Answer.—No. By Sec. 3 of the Public Health (Buildings in Streets) Act, 1888, it is enacted that "it shall not be lawful in any urban district without the written consent of the Urban Authority to erect or bring forward any house or building in any street, or any part of such house or building, beyond the front main wall of the house or building on either side thereof in the same street, nor to build any addition to any house or building beyond the front main wall of the house or building on either side of the same." The erection of a bay window under the circumstances named by our correspondent would render the offender liable to the penalties prescribed by the Act.

1085.—SHOP HOURS ACT INSPECTORS: DUTIES OF.—"R. C. U." writes:—"Will you kindly inform me what are the duties of an Inspector appointed under the Shop Hours Act? Also if you know of any book having reference to such duties?"

Answer.—We answered a similar query (No. 1018) in our issue of April 1st, to which our correspondent should refer.

1086.—NUISANCE FROM DRAIN: PROCEDURE.—"C. G." writes:—"A. has a drain passing under the kitchen of another house belonging to a different owner, B. The drain was constructed before the kitchen was erected. A nuisance now arises in the basement of B.'s house, owing to moisture soaking through the walls, presumably from the drain. The probabilities are that B. has, during some repairs, choked the drain at the farther end of his premises. B. now lays a complaint against A. We have no system of sewerage, neither have we any bye-laws. I have served a notice on B. to abate the nuisance on his premises, but he refuses to do so. Do you think I should have any difficulty in getting an order made on B. to abate the nuisance?"

Answer.—We should advise our correspondent to get more definitely at the facts of the case. It is not sufficient to presume that the moisture arises from A.'s drain, or *conjecture* that the drain is blocked. It would be useless to go before a court of summary jurisdiction for an order with such evidence. The Inspector of Nuisances must proceed under Sec. 41 of the Public Health Act, 1875, and obtain the authority of his Council to enter the premises whereon the alleged nuisance exists, open the ground, and examine the drain; and if the drain appears to be in bad condition, the Local Authority, as prescribed by the section, should forthwith give notice to the owner, B., of the premises, to do the necessary work of repair or relaying. We presume that the drain receives the drainage of one house only. If it be otherwise, and receives the drainage of two or more houses, it may be a sewer vested in and repairable by the Local Authority. We do not know what our correspondent means by stating that they have no system of sewerage and no bye-laws. The absence of either of these does not affect the question.

1087.—BUILDING BYE-LAWS: ERECTION OF NEW BUILDING.—"W. C. C." writes:—"I beg to thank you for your reply to Query 1077, and now send you the plan as requested, also copy of Building Bye-laws."

Answer.—It is provided by Bye-law 55 of this Council's Bye-laws that every person who shall erect a new domestic building shall provide in front of such building an open space, which measured to the boundary of any lands or premises immediately opposite or to the opposite side of any street which such building may front, shall throughout the whole line of frontage of such building extend to a distance of 24ft. at the least. From the plan submitted to us it appears that the distance from the front of the proposed club-room to the opposite side of the street on which it abuts is only 15ft. If the proposed club-room can be held to be a domestic building, it therefore follows that its erection as proposed would be a contravention of the Bye-laws. But on referring to Clause 1 of the Bye-laws for an interpretation of the term "domestic building," we find the term "domestic building" defined as "a dwelling-house, or an office, building, or other out-building appurtenant to a dwelling-house, whether attached thereto or not, or a shop or any other building not being a public building or of the warehouse class." We are of opinion that the proposed club-room cannot be held to be a domestic building, but that it falls within the definition of a "public building" which is interpreted in Clause 1. There may, however, be some circumstances in connection with the proposed club-room which may bring it within the definition of a "domestic building," such as the use of any part of it for the purposes of a dwelling-house for a caretaker, and if so the bye-law will apply. If, however, the circumstances do not show that the building can be held to be a "domestic building," the Local Authority should consider whether the owner is not commencing to lay out a new street, and if such be the case, he should be required to set back 18ft. from the centre of the existing road, as the bye-laws require new streets to be of a width of 36ft. For it has been held over and over again that an old road may become a new street by the erection of houses alongside it. See Robinson *v.* Barton Local Board, 48 J.P. 276, &c. &c. We think the Local Authority would be justified in requiring the proposed building and the street widened, in so far as the building must be set back 18ft. from the centre of the existing road.

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SALE.—May 21st.—Draining.—The Cemetery Committee, 4, School-road, Sale.

ALNWICK.—May 23rd.—Cleaning out, &c., Sewage Ditch.—Mr. H. W. Walton, Alnwick.

CLAYTON-LE-MOORS (LANCS.).—May 23rd.—Sewer, &c.—Mr. Arthur Dodgeon, surveyor.

BANGOR (IRELAND). — May 24th. — Sewer. — The Town Commissioner's Office.

KNUTSFORD. — May 24th. — Sewage Works. — Mr. Walter J. Downs, surveyor, Knutsford.

PONTEFRACT.—May 24th.—Sewers.—Mr. A. Oddy, borough surveyor, Town Hall, Pontefract.

GREENWICH.—May 25th.—Sewer.—The offices of the Board, 141, Greenwich-road, Greenwich.

WEST ARDSLEY (YORKS).—May 25th–June 3rd.—Sewers.—Mr. Frank Massie, A.M.I.C.E., Tetley House, Kirkgate.

WIGAN. — May 25th. — Scavenging. — Mr. Henry Ackerley, 9, Victoria-buildings, King-street, Wigan.

HULL.—May 26th.—Nightsoil Collection.—Inspector of Nuisances, Lowgate.

TURTON (LANCS).—May 26th.—Sewage Purification Works.—Mr. V. W. Laithwaite, surveyor to the Council, Public Offices, Bromley Cross, near Bolton.

WESTHOUGHTON (LANCS).—May 23rd.—Sewers.—Mr. Thos. Partington, clerk and surveyor.

BURY ST. EDMUNDS.—June 13th.—Plant.—Mr. F. Hastings Medhurst, B.Sc., M.I.E.E., consulting engineer to the Corporation, Westminster-chambers, 13, Victoria-street, S.W.

Vacancies.

ASSISTANT ENGINEER, &c. (WATERFORD, May 26th).—For the Public Health Committee. Salary £4 a week. Mr. James J. Feely, town clerk, Waterford.

BUILDING FOREMAN (WALTHAMSTOW, May 27th).—For the Urban District Council. Salary £3 10s. per week. Mr. E. J. Gowen, clerk, Town Hall, Walthamstow.

CLERK OF WORKS (BRISTOL, May 20th).—For the Bristol School Board. Remuneration £3 3s. per week. Mr. Wm. Avery Adams, clerk, Guildhall, Bristol.

CLERK OF WORKS (TRING, HERTS, June 4th).—For the Urban District Council. Salary £3 3s. per week. Mr. A. W. Vaisey, clerk, Council Offices, Tring.

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DEPUTY CITY SURVEYOR (CARLISLE, May 23rd).—For the Corporation. Salary £150 per annum, rising by annual increments of £10 to a maximum of £200 per annum. Mr. Henry C. Marks, A.M.I.C.E., city surveyor, 36, Fisher-street, Carlisle.

ENGINEER, &c. (HARTLEPOOL, May 24th).—For the Hartlepool Port and Harbour Commissioners. Salary £400 per annum. Mr. S. Herbert Belk, law clerk to the Commissioners, West Hartlepool.

ENGINEER AND SURVEYOR (SUTTON COLDFIELD, May 23rd).—For the Corporation. Salary £300 per annum. Mr. Thos. V. Holbeche, town clerk, Sutton Coldfield.

HIGHWAYS SURVEYOR (HAVERFORDWEST, May 24th).—For the Rural District Council. Salary, £110 per annum. Mr. John James, clerk, Haverfordwest.

SANITARY INSPECTOR (LONDON, S.E., June 2nd.—For the Vestry of Lambeth. Salary, £120, rising £5 yearly to £170. Application forms to be obtained at the Vestry Hall, and sent to Mr. Henry J. Smith, clerk, Lambeth Vestry Hall, Kennington Green, S.E.

SANITARY INSPECTOR (WARWICK, June 4th).—For the Town Council. Mr. Brabazon Campbell, town clerk, Jury-street, Warwick. The inclusive salary will be £62 per annum.

SURVEYOR (BEXLEY, May 25th).—For the Urban District Council. Salary, £200 per annum. Mr. Thos. G. Baines, clerk, Council Offices, Bexley Heath.

SURVEYOR (THAKEHAM, May 20th).—For the Rural District Council. Salary £100 per annum. Mr. Herbert Parsons, clerk, Storrington, Sussex.

WATER INSPECTOR (LLANDUDNO, May 28th).—For the Urban District Council. Wages, 30s. weekly. Mr. E. Paley Stephenson, A.M.I.C.E, engineer, Council Offices, Llandudno.

COMPETITIONS.

FORMBY (LANCS), July 1st.—Sewerage Scheme.—The Formby Parochial Committee invite competitive schemes for the sewerage of a portion of the township of Formby. Premiums are offered amounting to £100 for the scheme considered first in order of merit, £50 for the second, and £25 for the third. Mr. J. H. Havelock Sutton, Piercefield-road, Formby. A professional assessor will be appointed to adjudicate upon the plans.

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Clerk to the Council.

Clerk's Office, Storrington, Sussex,
May 11th, 1898.

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THE

Sanitary Record,

MAY 27, 1898.

Notes.

The New Prison Rules.

To those who believe that prison treatment should have for its object the working of a true reform in the character of criminals, the proposed new prison rules will give considerable satisfaction. On Friday last the Home Secretary caused copies of two drafts to be distributed to the members of the Grand Committee on Law. In one of these local prisons are dealt with, and the other refers to convict establishments. The harsh treatment hitherto prevailing in the case of prisoners awaiting trial is to be modified. "Searching" is to be carried out with "due regard to decency and self-respect." In penal servitude

cases the use of the plank-bed is to be practically discontinued, except as punishment for incorrigibles. Physical and mental weakness is not to prevent the giving of marks by which a partial remission of the sentence may be obtained. Unproductive labour—"the mill" and "the crank"—are to be abolished. Women are to be put to such work as may be of use to them when their term of punishment ceases; and illiterate prisoners are to have schooling at least two days per week. Outdoor exercise is to be given with greater regularity than in the past, for where hitherto it has not been possible to grant this on wet days, covered walks are to be provided. Other rules refer to granting the use of books from the prison library; the modification of the "silent" system, letter writing, &c. The consideration of these proposed rules by the Grand Committee is postponed until after the Whitsuntide recess.

Sewage Bacteriology at the Chemical Society.

The paper recently read by Messrs. Dibdin and Thudicum before the Chemical Society continues to excite the interest of all engaged in watching the development of the latest experiments in sewage treatment. That bacteriological methods are successful in comparatively small systems has long been demonstrated beyond disproof; yet many have expressed doubts as to their power to successfully meet the requirements of large manufacturing towns and cities. But even these doubts are now set at rest, for, as the writers of the paper showed, the trial bacteria bed at Knostrop has more than accomplished what it was expected to. Over 200,000 gallons of sewage from Leeds (which included the waste products from copper precipitation and galvanising works, tanneries, and any amount of shoddy waste) daily pass through the coke filters, the effluent therefrom being so pure that fish live in it. At Maidstone, with its numerous breweries, and West Bromwich, with "waste pickle liquors from galvanising works," similar satisfactory results have been obtained, thus conclusively proving that, even under the most trying conditions, the "truly scientific system" surpasses all others in its efficacy and efficiency. The publication of this paper is exceedingly opportune, and the facts therein related will no doubt provide excellent evidence for the recently-appointed Royal Commission.

A Woman Inspector for the Potteries.

It is hard to break through the prejudices and practices of a great Government Department. For years the Home-office fought against the appointment of women to inspectorships of any kind, and to-day it is equally zealous in contesting any suggestions for further departures from the administrative path it has itself marked out. Take, for instance, the reply given by the Home Secretary to the deputation which waited on him last week, asking for the appointment of a woman Inspector for the Potteries district. The facts brought forward showed there was an average—according to Government returns—of 400 deaths every year from lead poisoning, most of the victims being women and young people. In addition cases of blindness were numerous in the particular district known as the "Potteries." It is stated that upwards of 20,000 women are employed in the "potting" industry. For this reason it was urged that a woman Inspector should be appointed to inquire and report where so large a number of women and young children were employed in what was admitted to be a dangerous trade. The Home Secretary in the course of his reply admitted the truth of the facts put forth; and said experts were at present in the district making inquiries into the effect of certain glazes and pigments upon the workers. New rules were also being printed enforcing the periodical inspection of women and children, and the provision of better arrangements for washing and for taking meals. But he could not consent to this inspection being carried out by "a special lady Inspector," because he thought that touched "a difficult administrative question." Are decency and humanity to be sacrificed for "red-tape"? The time for such antiquated ideas has long since passed away. If the inspection of women is to be carried out, for common decency's sake let a woman be appointed to do it. The members of the deputation who are members of Parliament must bring the question before the House of Commons, and ask it to do what the Home-office declines. We are sure the country will support them in their demand.

The Responsibility of Employers.

An important judgment was recently delivered in the Court of Queen's Bench as to the responsibility of employers for the conduct of their servants. The case arose out of the Merchandise Marks Act, 1887. A shop assistant had sold a ham as "Scotch," but which in reality was of foreign origin. A summons was taken out against the firm, and the borough magistrates convicted. A case was ordered to be stated, and it was argued before Mr. Justice Wright and Mr. Justice Darling, who sustained the decision of the bench. But the firm was not satisfied, and appealed to the Queen's Bench. A long judgment was given by the Lord Chief Justice, in which he carefully analysed the case in all its bearings. Concluding, he said, "The appellant carries on an extensive business as grocer and provision dealer, having, it appears, six shops or branch establishments, and having also a wholesale warehouse. It is obvious that if sales with false trade descriptions could be carried out in these establishments with impunity so far as the principal is concerned, the Act would, to a large extent, be nugatory. I conceive the effect of the Act to be to make the master or principal liable criminally (as he is already by law civilly) for the acts of his agents and servants in all cases within the sections with which we are dealing, where the conduct constituting the offence was pursued by such servants and agents within the scope or in the course of their employment, subject to this—that the master or principal may be relieved from criminal responsibility, where he can prove that he had acted in good faith and had done all that was reasonably possible to do to prevent the commission by his agents and servants of offences against the Act. The result therefore is that the conviction will be affirmed, and with costs." If the judgment had

been otherwise, it would have made it almost impossible for Food and similar Inspectors to have obtained convictions—at any rate, of the really responsible parties.

Edward Bellamy.

Few books of a socialistic character have created more interest than "Looking Backward," the production of Edward Bellamy, who died on Sunday last in his home at Chicopsee Falls, Massachusetts. Mr. Bellamy wrote other books, but the one we have named made him famous. In the form of a dream he endeavoured to depict what the world would be a hundred years hence. Those who have read the work will recollect the vast improvements he predicted would be experienced in the hygienic conditions in which men would be living. To some, much that he wrote may appear nothing more than the fancies of an idealist; but, judging by comparisons, his predictions may prove much nearer truth than we at present imagine. Think of the condition of the world at the commencement of the present century; then count up what has been discovered and invented in the intervening years, and the transformation to-day is no less marvellous than anything set forth in "Looking Backward." Edward Bellamy may have been a "dreamer;" but such men by their parables inspire their fellows to noble thoughts and grand accomplishments, and the hope for better days and happier conditions gives zest to the endeavour to win them; if not for themselves, for their children.

Municipal and County Engineers.

Not the least important feature in connection with the work of the Incorporated Association of Municipal and County Engineers is the holding of district meetings in various important centres. Many are able to attend these gatherings who, for obvious reasons, are prevented from taking part in the larger or national meetings. A few weeks ago we reported the proceedings of one of these meetings at Wimbledon, and we now have before us the programme of another, viz., the Yorkshire district meeting, which is to be held at Harrogate on Saturday, June 4th. The formal business of the meeting will be the election of a district secretary. The attraction to many, however, will be the visit to the Gouthwaite Compensation Reservoir. The members are to meet at Harrogate station at 9 o'clock, travelling from there to Pateley Bridge Station, where brakes will be in waiting to convey them to the reservoir, about three miles from the station. Every facility will be given for a thorough inspection of the works, which possess many features of special interest. At noon light refreshments will be provided by the Waterworks Committee, and at 5.30 the same Committee will entertain the visitors to dinner at the King's Arms Hotel. Members intending to be present should at once send on their names to Hon. District Secretary, T. W. Stainthorpe, A.M.I.C.E., Council Offices, Grangetown, Yorks.

Nuisances by Noise.

There are no provisions in the Public Health Act, 1875, which bring nuisances by noise within the purview of Local Authorities who have to administer the Act. Such could only be removed by an action at common law, by a private individual who suffered from their continuance With regard to most nuisances of this character, such as those from engines, factories, &c., redress will continue to be obtainable only by a private action. In the case, however, of nuisances by noise, such as from playing instruments, &c., to the annoyance of the inmate of any house, we think the decision of the High Court on the 14th inst., in Kruse *v.* Johnson, will have a most important effect. The case was an appeal from the Justices of the Bearsted Division of the county of Kent, raising the question of whether a bye-law made by the County Council of Kent was valid, and was stated in the Queen's Bench Division before the Lord Chief Justice of England and numerous other judges. The facts of the case were that the appellant on October 17th, 1897, persisted in singing in a public highway within fifty yards of a dwelling-house after having been required by a constable to desist, and that he was, on the occasion in question, conducting an open-air religious service, and that in so doing he contravened one of the bye-laws of the County Council, which was as follows:—"Playing musical instruments. No person shall sound or play upon any musical or noisy instrument or sing in any public place or highway within fifty yards of any dwelling-house after being requested by any constable or by any inmate of such house personally or by his or her servant to desist," &c. On behalf of the appellant it was contended that the bye-law was *ultra vires* on the ground that it was unreasonable, and therefore bad. The bye-law was made in pursuance of powers conferred on the County Council by Sec. 16 of the Local Government Act, 1888. The Lord Chief Justice delivered a lengthy judgment, in which all the other judges—with the exception of Mr. Justice Mathew—concurred, and was, shortly, to the effect that the bye-law in question was reasonable and valid, and that the appellant was rightly convicted. The result of this decision will be, we predict, that other County Councils will follow the example of the Kent County Council, and adopt bye-laws of a similar purport to restrict nuisances by noise of the character described in the Kent County Council bye-law.

Lady Cyclists and Publicans.

According to our esteemed contemporary *Justice of the Peace*, it would appear that a publican who refuses to admit lady cyclists in "rational dress" as guests in his coffee-room is, it is believed, acting within his legal rights. Under the Licensing Acts a publican, it seems, has a right to turn out persons who are drunken, violent, quarrelsome, or disorderly, or whose presence on his premises would subject him to a penalty. He may also, it is stated, at common law exclude persons whose presence might be reasonably objectionable to other guests in his house, as a chimney-sweep in his working attire, or a person accompanied by a large dog which causes alarm, and so it is deduced that a publican may legally exclude the lady in "bloomers" so long as such costume is reasonably objectionable to other guests. While we have very considerable respect for the opinions given by the legal editors of our contemporary, we venture to think it is very desirable that a "test case" should be taken

to determine whether a publican is to be allowed to exclude lady cyclists to suit his whims, for in the case referred to there does not appear to have been any evidence that the presence of the lady in rational dress was objectionable. If the representatives of John Barleycorn are to be permitted to exercise such extensive powers as to set themselves up to be judges of male and female attire the privileges of the public are likely to be considerably infringed.

The Suppression of Rabies.

The parliamentary return of proceedings under the Diseases of Animals Act during the past year, which has now been issued by the Board of Agriculture, contains much interesting information regarding the areas in England and Wales where muzzling orders are in force, and the districts where rabies has been prevalent, and other miscellaneous matters. But the chief element of interest in the report is that part of it which makes review of the past, and looks forward to the future. Mr. Alexander C. Cope, the Chief Veterinary Officer, says that "the returns for the year 1897 show such a satisfactory diminution in the number of cases in Great Britain as to encourage the hope that rabies, which has existed in this country from time immemorial, will be entirely eradicated." That is a most encouraging prospect, and fully justifies the policy of muzzling that has been so much attacked, on account of the discomfort it occasions to dogs. When the total extinction of rabies is an accomplished fact, we may then hope to do away with the necessity for muzzling orders.

Work at the Pasteur Institute.

From this interesting record of the successful results of the policy pursued by our own Board of Agriculture, it is instructive to turn to the annual report of the Pasteur Institute for 1897, which shows that of 1521 persons who underwent the preventive treatment at the Institute last year, six died, the mortality being at the rate of nearly ·40 per cent. The returns of the past eleven years, since the work of the Institute commenced, show that by far the largest number of cases was treated in the first year. In that year there were 2671 patients treated, and the rate of mortality was ·94 per cent. Since then the number of patients treated every year has fluctuated considerably, the lowest number being in 1896, when there were only 1308 cases. The mortality rate also underwent a steady decrease for a number of years. In 1892 it was only ·22 per cent., which is the lowest that has yet been attained; but since then it has been somewhat higher. From which it would appear that, while the Institute still continues to attract large numbers of patients from all parts of the world, its popularity has not been so marked during the past half-dozen years as it was during the earlier period of its existence.

The Sanitary Condition of Potato-diggers.

We are indebted to Dr. McVail, Medical Officer for the counties of Stirling and Dumbarton, for directing public attention to the lamentable condition of a class of the population of whose very existence note is seldom taken. We refer to the migratory class known as potato-diggers. They come for the most part from Ireland, scattering themselves over the face of the country in gangs, and moving from farm to farm as their services may be required. The character of the accommodation to which they are accustomed during their wanderings may be judged from the facts which Dr. McVail elicited regarding a particular gang in Stirlingshire, whose experience is stated to be by no means exceptional. The gang, of twenty-one men and women, were all lodged in a bothy, consisting of a single apartment, 17ft. square, without the faintest suggestion of any sanitary conveniences, the surroundings being, on the contrary, as insanitary as it is well possible to conceive. Small wonder that the Medical Officer should have declared that never before had he seen human beings lodged under conditions so utterly indefensible as regards both health and decency, and still less wonder that such a deplorable condition of affairs should have been followed by an outbreak of enteric fever. And yet the poor people were not sufficiently educated to be even discontented with their wretched surroundings. But what must we think of the farmers who have so little regard for the well-being of their employés as to suffer the continuance of such a state of things, allowing human beings to herd together like cattle, to the danger, not merely of their own health and lives, but also of those of the whole neighbourhood?

A Case of Ptomaine Poisoning.

Many of our readers will doubtless read with interest the report which appears elsewhere in our columns, of the action which was tried last week, before Mr. Justice Hawkins and a special jury, in the Queen's Bench Division, and in which damages were claimed from a firm of butchers for the sale of what was alleged to be unsound meat. The beef was cooked immediately after purchase, but was not consumed till a couple of days later, having in the interval been kept in the household meat safe. All the members of the family who partook of the meat were afterwards attacked by sickness, and they were all pronounced to be suffering from ptomaine poisoning. The plaintiff jumped to the conclusion that the meat must have been unsound when sold, and brought his action of damages against the butchers accordingly, but the facts which were brought to light, in the course of the evidence, put a very different complexion on the case. Briefly, the line of evidence was this—the meat safe was shown to be one which projected into the well of the tenement, and in the bottom of the well the refuse of the various tenants of the building was daily gathered for removal. It was also proved by the medical witnesses that the poisonous character of ptomaines is due to the agency of certain bacteria, which may be derived from various sources, and which may be developed after cooking in meat which was at first perfectly sound. Now the nature of the place where the meat was kept was one which was favourable to the development of such bacteria, and it was not, therefore, surprising that the jury should have inferred that the meat must have become unsound while in the plaintiff's possession, especially as it appeared that other persons who bought and consumed portions of the same meat were in nowise affected.

What Constitutes a Guarantee?

An interesting case under the Food and Drugs Act, raising a question as to the legal effect of guarantees, has just been decided in the Sheriff Court of Aberdeen; and as it is understood to be the first case of the kind in Scotland, considerable importance attaches to the decision. The article in question was a bottle of vinegar, to which was attached a printed label bearing the words, "Finest Malt Vinegar —Guaranteed Genuine." Notwithstanding this guarantee the vinegar was proved on analysis to be deficient in acetic acid to the extent of not less than 50 per cent. compared with vinegar of good quality, and not less than 25 per cent. compared with the lowest class of vinegar. In defence it was pleaded that the accused purchased the article as of the same nature, substance, and quality as that demanded by the prosecutor, and he had no reason to believe that it was otherwise when he sold it. He sold it in the same state in which he purchased it, in the belief that it was pure, and in accordance with the warranty given on the label affixed to the bottle. The question was, whether this was enough to protect the seller from the penalties provided in the Act, and especially whether the guarantee on the label was sufficient to secure him immunity. The Sheriff held that it was not; that the label was a mere manufacturer's label, which must be taken for what it was worth, and that such a warranty as was necessary to satisfy the requirements of the statute must be a written warranty.

THE CHEMICAL AND BIOLOGICAL ANALYSIS OF WATER.

By T. H. Pearmain and C. G. Moor, M.A. (Cantab).

Members of the Society of Public Analysts. Authors of "Applied Bacteriology;" "The Analysis of Food and Drugs," &c.

(*Continued from page* 532.)

THE COLLECTION OF SAMPLES OF WATER FOR ANALYSIS.

The greatest care should be taken in collecting samples of water for the purpose of analysis, in order to secure average and representative samples of the supply under examination. The amount of water required for an ordinary sanitary analysis of water is half a gallon, and the most convenient receptacle for containing the samples are the stoppered 80 oz., "Winchester Quart" bottles, which are readily to be obtained at any chemist's shop. Corked bottles should never under any circumstances be used. If a full analysis is required, as, for instance, in the case of judging the suitability of water for brewing or boiler purposes, a larger quantity of water is required, say, from one to two gallons. The bottles used for collecting the samples must first be thoroughly cleansed by washing with hot soda to remove traces of grease, and then with a little dilute hydrochloric or sulphuric acid, and then well rinsed with water until the last traces of acid are completely removed. It is preferable whenever possible to use new bottles, but whether the bottle is new or not it must be well rinsed with water several times, and lastly with distilled water and well drained. It is safest never to use bottles which have contained organic fluids.

If the sample of water to be examined is to be taken from a pump, it should be allowed to run to waste for a short time before collecting. In the case of tap water, it should also be allowed to run for a time before taking a sample, unless it is desired to examine the water for the presence of lead, in which case it may be advisable to take the first runnings, so as to see whether it is able to dissolve the metal through standing in the pipes. In taking samples from a river, streams, or lakes, care should be taken to avoid any floating scum, or the stirring up of mud from the bottom, and the sample should be always taken away from the banks. In taking samples from public supplies they should be collected from a hydrant in direct connection with the main, and not from cisterns or other storage receptacles.

No sealing-wax, linseed paste, or other form of sealing material should be put on the stoppers of water samples, owing to the danger of contaminating the samples, but the stopper should always be covered with a clean piece of parchment paper, the string used in fastening this can be sealed with sealing wax if desired. The bottles after labelling can then be packed in straw or other suitable packing material, and contained in hampers or boxes for carriage. Water samples should be sent off to the analyst with the least possible delay, so that the analysis can be put in hand as soon as possible. This is very important, as waters, particularly polluted ones, are liable to undergo chemical changes on keeping. It is also of the greatest importance that a proper record should be sent of the date of collection, preferably upon a label upon the bottle itself, of the source of the water, whether derived from pump, river, &c., particulars in reference to sources of possible pollution, such as proximity to cesspools, stables, sewers, or manufacturing establishments. In the case of wells the depth should given, and also the character of the local geological conditions should be given whenever possible.

Since the object of a water analysis is most frequently to determine as to whether it is fit for domestic purposes, too much importance cannot be insisted upon as to the necessity of supplying the analyst with these particulars as to its history. It is often difficult to give a correct opinion as to the purity or safety of a water without the knowledge of these facts.

When a bacteriological examination is needed upon a sample of water, special conditions and precautions have to be adopted for its collection; these will, however, be dealt with under the section dealing with the biological examination of water. For the ordinary chemical examination of a sample of water for sanitary purposes, it is necessary to have the following data, for expressing an opinion as to its freedom or otherwise from pollution with sewage, or other dangerous putrescible matter, and general suitability for domestic purposes:—

Physical characters and nature of sediment, if any.
Free or saline ammonia.
Albuminoid ammonia.
Amount of oxygen consumed for oxidation of contained organic matter.
Nitrogen present as nitrates and nitrites.

Total solid matter. Loss of same on ignition.
Chlorine.
Hardness.
Phosphates and poisonous metals.

STATEMENT OF THE RESULTS OF ANALYSIS.

Much confusion is caused owing to the fact that there is no uniformity in the numerical statement of analytical results. Owing to the fact that the difference between a pure water and a badly-polluted one, may only be the difference of a few parts or fractions of parts of the various constituents, say, in 100,000 parts of the sample, it becomes exceedingly difficult for the analyst to attempt to make the lay mind to realise the true significance of analytical data in water analysis.

The results of analysis are still commonly expressed in grains per gallon, *i.e.*, in parts per 70,000, since there are this number of grains in the gallon. Some analysts prefer to report the solid constituents as grains per gallon, and those representing the organic impurity in terms of parts per million (= milligrammes per litre).

The method of reporting in parts per 100,000 (= milligrammes per 100 c.c.) is undoubtedly the best, as, being founded upon a decimal system, they are at once comparable with analyses made abroad. This method of stating analytical data in connection with water analysis is in common use on the Continent, and is rapidly coming into use in this country. Results expressed as grains per gallon can be converted into parts per 100,000 by dividing by 7 and multiplying by 10, whilst multiplying by 7 and dividing by 10 converts parts per 100,000 into grains per gallon (= parts per 70,000).

When the results are desired in terms of grains per gallon, it is convenient to measure 70 c.c. for each estimation or a multiple of this quantity by means of a special pipette. This quantity (70 c.c.) represents a "miniature gallon," and the results obtained can at once be expressed in terms of grains per Imperial gallon. Since 1 c.c. weighs 1 gramme at the ordinary temperature, therefore 70 c.c., the miniature gallon, weighs 70 grammes or 70,000 milligrammes. Therefore milligrammes per 70,000 is equivalent to parts per 70,000 or grains per gallon. In the same way if 100 c.c. is taken for each estimation, each milligramme of constituent found represents directly parts per 100,000, since 100 c.c. = 100,000 milligrammes.

THE PHYSICAL CHARACTERS.

The sample is shaken up and poured out into a colourless glass tube 2ft. long and 2in. in diameter, which has been ground flat at the closed end, and the clearness, presence of suspended matter, colour, &c., observed.

Clearness.—The degrees of turbidity may be expressed as "faintly opalescent," "very slightly turbid," "slightly turbid," "turbid," &c. The turbidity or haziness in water is caused by the minute particles of suspended matter, the nature of which is subsequently determined by a microscopical examination. The best quality waters are, of course, brilliant and clear, but these qualities cannot be considered as any evidence of purity, for the most grossly contaminated waters may be both bright and clear.

Colour.—This is best observed by looking down the tube upon a white porcelain slab. Good waters possess but little, if any, colour when thus examined, at the most only a faint greyish-blue or greenish tint. If any yellow or brownish tinge is seen it will probably be due to the presence of a large amount of sewage pollution, or vegetable contamination in the form of peat, which frequently occurs in upland surface waters. Finely-divided oxide of iron and clay may also give rise to brown tints in water.

A marked greenish tinge may be communicated to water by chlorophyll—containing algæ. Water from rivers that receive the waste waters discharged from various manufactories may be variously coloured, particularly those from dye-works.

If considered necessary, a permanent record of the colour of a water, although comparatively unimportant, and seldom required in practice, can be made by means of the apparatus devised by Messrs. Crookes, Odling, and Tidy. In this apparatus the water is compared against dilute standard solutions of copper sulphate, cobalt chloride and ferric chloride. These are contained in hollow prisms, which are made to slide across one another in front of a circular hole in a metal shield. Thus, any desired combination of blue and brown tints can be obtained, and the colour of the water under examination is stated in so many millimetres thick of blue, and so many of brown. The valuable instrument known as Lovibond's Tintometer would be a more ready means of permanently registering the colour of a water.

Smell.—The odour of a water can be best ascertained by placing about 200 c.c. of the sample in a chemically clean stoppered bottle of about 250 c.c. capacity, and immersing this in warm water, at about 65 deg. Cent., for a few minutes. The stopper is then removed and deep sniffs taken at its contents. Any sewage or urinous odour, or any contamination with coal gas, sulphuretted hydrogen, &c., is thus easily detected.

A more delicate method than this is that of M. Boudriment, who shakes 100 c.c. of the suspected water with an equal volume of ether, which is then separated off and allowed to evaporate at the temperature of the room; the residue left after the evaporation of the ether is then carefully smelt. The test may be rendered yet more delicate by distilling a litre and collecting the first 50 c.c. that come over, and treating them with ether as above described.

Many natural waters, *e.g.*, peaty waters, give off peculiar and characteristic odours, which are very difficult to describe. The test of smell is, however, very unreliable, and is one into which a great deal of personal equation enters. Absolutely pure water is quite free from odour, but waters from some geological formations occasionally have a faint odour of sulphuretted hydrogen, particularly those from some sandy and clay formations.

It must not be overlooked that certain "mineral" waters contain large amounts of sulphuretted hydrogen.

Certain infusoria and algæ may be the cause of bad odours in water supplies.

The *Uroglena Americana* is frequently the source of a "fishy" odour, and is a frequent source of trouble in certain water supplies in the United States. Others give rise to an odour recalling cucumbers. The *Volvox globator* also gives rise to a fishy odour and taste. *Busaria gastris* gives rise to a seaweed-like odour, and the diatoms

Asterionella and *Tabellaria* sometimes give rise to an "aromatic" odour in water supplies. Recently the Cheltenham public water supply suddenly acquired a fishy odour and flavour, which was found to be due to a copious growth of *Chara fœtida* upon the walls of the reservoirs.

Taste.—The pleasant taste of a good water is due to the dissolved gases, such as carbon dioxide and air, contained therein. The flat taste of rain and distilled water is due to the absence of these gases. The sense of taste is practically useless as an indication of the purity or otherwise of a sample of water. Common salt can be present in amounts as large as 60 grains to the gallon, without causing a brackish taste. Iron salts, however, in very small amounts (as little as 0·2 grains per gallon) will give rise to a very decided chalybeate taste.

As stated above, various infusoria and algæ may be the cause of various peculiar and unpleasant flavours in waters.

A certain amount of discretion should always be exercised by the analyst before tasting samples the history and origin of which is unknown, as, for obvious reasons, the safety of such a procedure may be very questionable.

Reaction.—The degree of alkalinity or acidity possessed by a sample of water is not infrequently a factor of great importance. Most natural waters will be found to be faintly alkaline owing to the presence of calcium bicarbonate, and less frequently to sodium carbonate. Many waters are quite neutral in reaction. Badly-polluted waters may be alkaline due to the presence of ammonium carbonate resulting from the decomposition of the urea contained in urine. Many upland surface waters are decidedly acid, due to humic, ulmic, geic, and other organic acids, derived from peat. The waste waters of factories may be excessively acid or alkaline, and these may thus contaminate a large body of water. When necessary, the reaction of a sample of water is determined in terms of centi-normal acid or alkali, as the case may be, using dilute solutions of methyl-orange, phenol-pthalein, or lacmoid, as indicator. If the acidity disappears on boiling, it is due to carbon dioxide. Lacmoid possesses the advantage over phenol-pthalein that it is unaffected by carbon dioxide.

Aëration.—A good water, to be palatable, must be well aërated. The highest-class waters are invariably well aërated. Waters from deep wells, from the chalk and limestone, are frequently highly charged with carbon dioxide. Evidence of this is frequently afforded by minute gas bubbles collecting upon the sides of the bottle containing the sample. The estimation of the dissolved gases in water, which is sometimes required, will be dealt with later.

(*To be continued.*)

TO OUR READERS.

The Editor solicits the co-operation of readers in making THE SANITARY RECORD *more attractive by means of pen-and-ink sketches, photographs, and diagrams. There are many phases of sanitary work which lend themselves admirably to illustration. By this means not only individual articles, but the journal as a whole will be brightened.*

LIME, MORTAR, AND CEMENT: THEIR COMPOSITION AND ANALYSES.

By W. J. DIBDIN, F.I.C., F.C.S., &c.

(*Continued from page* 531.)

CHAPTER IV.

EARLY ART OF MANUFACTURING CEMENT AND MORTAR.

When we consider the question of the early use of artificial mortar and cement, it soon becomes clear that either moistened clay or the natural bitumen was employed by the ancients to cement the stones of the masonry together, but it is an open question as to what artificial mortar was first employed. It is clear that the Egyptians used mortar in their construction of the Pyramids, and from an analysis of that used in the Pyramid of Cheops is given by Mr. Cresy ("Theory and Practice of Engineering," pages 717 and 718), it would appear that in this respect they probably had not much to learn from our present-day knowledge.

The Greeks, as might be expected, used mortars with a lime base at a very early date, to cover walls constructed of unburnt bricks. According to Plinius and Vitruvius, the Palace of Crœsus, the Mausoleum, and the Palace of Attalus were thus protected, or ornamented in this manner. According to Strabo, the walls of Tyre were built of stone set with gypsum. (Burnell, "Limes, Cements, and Mortars.")

In Italy, the first people to employ mortar in their buildings were the Etruscans. The Romans, as is well known, derived all their knowledge of the arts from either the Etruscans or the Greeks. They added little to the general stock of knowledge as to the use of limes, but Vitruvius is the first author upon the subject whose works have descended to us, and according to him the ancients were by no means ignorant of many of the laws governing this matter; and, according to Burnell, Vitruvius was, in his opinion, as safe a guide as most of the authors who have treated of the subject until M. Vicat, whose work in the early days of the present century is even now quoted as classic.

Plinius and St. Augustine, continues Burnell, treat occasionally about limes and cements, the former principally to complain of the malpractices of the builders; the latter, to seek metaphysical comparisons. On the revival of literature, after the Cimmerian darkness of the Middle Ages, the authors who treated upon the art of building did little more than follow in the traces of Vitruvius. There was a difference of opinion, it is true, as to the quantity of sand which it was most advisable to use, some new limes, some puzzolanos, terrass, and ashes were employed to give certain other limes the faculty of setting under water; but until about the middle of the last century no advance seems to have been made towards ascertaining the principles which regulate this branch of chemistry.

It is, indeed, worthy of remark, our author wisely continues, that the more useful arts appear to be carefully studied until the practical results they are capable of producing are ascertained; then the rules drawn from such results are received implicitly for long periods, and any attempt to ascertain the laws which regulate them

is regarded as useless. We (the human race) appear to attain empirical knowledge quickly; scientific knowledge arrives at a much later period. So it was with limes, so it is with the casting and puddling of iron—a subject equally, if not more, interesting.

The first serious attempt (according to Burnell, page 4, *et seq.*) made to ascertain the causes which gave some limes the power of setting under water, and which modified their rates of hardening, was made by John Smeaton in 1756, in connection with the construction of the Eddystone Lighthouse. The results of his experiments are detailed in his account of the building of that work; Book III., Chap. III. The results he arrived at were very remarkable, not only for their practical utility, but also as an illustration of the ease with which a very acute observer may stop short on this side of the attainment of a great truth. Smeaton found that the commonly-received opinion that the hardest stones gave the best limes was only true as far as regarded each quality considered by itself. That is to say, that of limes not fit to be used as "water cements" those made of the hardest stones were the best for certain uses in the air; but that, whether obtained from the hardest marble or the softest chalk, such limes were equally useless when employed under water. He found that all limes which could set under water were obtained from the calcination of such limestones as contained a large portion of clay in their composition. His experiments led him to use, for the important work of the lighthouse, a cement compounded of blue lias lime from Abershaw, and of puzzolano brought from Civita Vecchia, near Rome. Smeaton, after giving a table showing that all the water limes were obtained from limestones containing clay in chemical combination in proportions varying from $\frac{3}{14}$ to $\frac{1}{17}$, goes on to say:—"That it remains a curious question, which I must leave to the learned naturalist and chemist, why an intermediate mixture of clay in the composition of limestone of any kind, either hard or soft, should render it capable of setting in water in a manner no pure lime I have yet seen, from any kind of stone whatsoever, has been capable of doing. It is easy to add clay in any proportion to a pure lime, but it produces no such effect. It is easy to add brick-dust, either finely or coarsely powdered, to such a lime in any proportion also, but this seems unattended with any other effect than what arises from other bodies, becomes porous and spongy, and therefore absorbent of water, as already hinted, and excepting what may reasonably be attributed to the irony particles that red brick-dust may contain. In short, I have as yet found no treatment of pure calcareous lime that rendered it more fit to set in water than it is in nature, except what is to be derived from the admixture of brass, puzzolano, and some ferruginous substance of a similar nature." Had Smeaton submitted the mixture of clay and lime to heat, and then ground the resulting clinker, he would have had "Portland Cement."

It was not until 1813, when Colets Descotils, on analysing the compact marl of Senouches which yields on calcination a lime capable of setting rapidly under water, found it nearly one quarter silica, which led him to the conclusion that the cause of the phenomenon consisted in the presence of a large quantity of siliceous matter, disseminated in very fine particles in the tissues of the stone itself. This view was confirmed by Vicat, who, in the course of a series of experiments carried out in Paris in 1817, composed hydraulic limes entirely by burning different mixtures of common lime, slacked spontaneously with clay; and the view that the cause of the setting of lime is due to the action set up by, or favoured by the presence of the silica, is now generally accepted.

There is, however, another factor which comes into play, and that is the alumina, which is always present in clay. In fact, as already shown, this substance is an essential element in its constitution, and the precise part which it plays in the molecular rearrangement yet remains to be ascertained.

NOTES ON
PRACTICAL SANITARY SCIENCE.

By WILLIAM H. MAXWELL.

Assistant Engineer and Surveyor, Leyton Urban District Council Author of "Drainage Work and Sanitary Fittings," "Ventilation Heating, and Lighting," &c., Certificates of the Association of Municipal and County Engineers, and Sanitary Institute.

(*Concluded from page* 534.)

GENERAL OBSERVATIONS ON REFUSE DESTRUCTORS.

The Question of Alleged Nuisance from Destructors.—Owing to defects both in the design and management of many of the early destructors, complaints of nuisance have frequently arisen, and have thereby brought all refuse destructor installations, both ancient and modern, into popular disrepute. When it becomes known that it is intended to erect a destructor upon any given site in a town, the case of its efficiency or otherwise is invariably prejudged, and numerous objections on the ground of its being a source of nuisance are at once conjured up by popular prejudice. It cannot be denied, however, that some of the old furnaces have been decided offenders in the direction indicated; but such is not the case with the modern improved type of high-temperature furnace, and oftentimes, were it not for the great prominence in the landscape of a tall chimney shaft, the existence of a refuse destructor in a neighbourhood would not be generally known by the inhabitants. At the present time there is no reason whatever why a destructor, properly designed and managed, should be a source of the slightest nuisance.

The nearness of inhabited houses to a destructor is not a matter of any great significance in regard to the question of the satisfactory working of the furnaces, as where there is a shaft of average height experience shows that when complaints of nuisance have been made, they usually originate from inhabitants who live some considerable distance from the site of the works, and especially from those residing in portions of the district approximately on a level with the top of the chimney shaft.

In the course of the inquiries made by the Engineer and Medical Officer of the London County Council, in connection with their joint report on "Dust Destructors," these officers, in several instances, were informed that there was much local opposition to the establishment of a destructor

when the scheme was in contemplation, and in some cases complaints of dust and smoke seem to have come to hand before any refuse was burnt in the furnaces.

It is a much more difficult matter than might at first sight appear to localise and trace to its source a given nuisance, and it is quite possible that in some instances the destructor has been accused of producing a smell which was really attributable to some other cause. The manager of a gas factory who complained that the neighbouring destructor brought the gasworks into discredit is certainly to be complimented on his ingenuity.

Any nuisances which may arise from destructor dust or pieces of charred paper are of a much more unmistakeable character than that of smells, as will be shown later, and, where these occur, must constitute a serious charge against the destructors concerned.

The use of forced draught, either by dry air or steam jets, is an effective means of preventing nuisance, and substantially increases the temperature of the furnace. Dr. Cameron writes in regard to the results of experiments carried out at one of the Leeds destructors that "the observed temperatures with the jets were 346 deg. Fah. above those without; but taking into account the fact that upon seventeen occasions in the one case against three in the other the temperature was too high to be registered, the real difference would be nearer 500 deg. Fah."

Out of forty-three towns included in the inquiries of the Borough Engineer of Ipswich, for the purposes of his report[1] on "Town Refuse Destructors," it appears that nineteen have on certain occasions had complaints of nuisances arising from the burning of refuse, which seem to have arisen from the escape of fine dust, small particles of burnt paper, and occasional smells, with the wind in a certain direction. These have been remedied by a screen fixed in the flue to intercept paper and fine dust, and the unconsumed gases destroyed by the application either of the Jones' cremator, which is fixed between the furnaces and the chimney, and maintained at a high temperature, or by steam jets for effecting the same end.

The Vestry of Paddington, in 1895, undertook investigations upon the destructor question, and, as the result of their inquiries, which extended to some thirty installations in various parts of the country, they conclude generally that the creation of nuisance in the process of burning is avoidable, and must be attributed to improper working of the destructor rather than to defects in the system. The nuisances that have been alleged to occur are dust from the tipping sheds and smoke shaft, and fumes from the furnaces and shaft. The scattering of dust from tipping sheds, they consider, can be obviated by the construction of suitably designed buildings, and dust and fumes from the shaft are due to insufficient length of flues or to overworking of the apparatus. Some smell has also arisen from the practice of cooling with a jet of water the hot clinker drawn from the furnace; but this can be done in a manner that will not permit the fumes to escape anywhere but up the flues.

Some instructive information upon the question of "Destructor Smells and Dust" has been given by Mr. Stevenson Macadam, Ph.D., F.I.C., &c., in the "Journal" of the Society of Chemical Industry, March 31st, 1896.

In regard to the soundness of the general practice of dealing with town refuse by fire Authorities are unanimous. So long as ten years ago—a considerable period in connection with the evolution of the refuse destructor—Mr. T. Codrington, M. Inst. C.E. (Local Government Board), reported that "the burning of town refuse by furnaces *already in use* appears to be successfully carried out. There is no accumulation of an offensive material at the works, and very little smell. Everything combustible is burned within a few hours of collection without nuisance, and at a cost which compares favourably with the old system of carting the refuse to tips. A valuable means is at the same time provided for effectually disposing of infected bedding and clothing, condemned meat and provisions, and the carcases of diseased animals. Further improvements may be expected, but the results already attained show that the destruction of the refuse of towns by fire is not only practicable, but is the best, and often the only way of dealing with it in a manner to satisfy sanitary requirements."

Since the above was written much has been achieved in respect of the possible improvements there anticipated. The following points are among the essentials for a *good* destructor:—

(1) The cells and flues must be so arranged that the fumes are drawn over the fire so as to enter into combustion with the heat from the furnace whilst on their way to the main flue. The function of a specially constructed cremator is thus effected in the furnace or cell itself.

(2) The temperature of the cell must be sufficiently high to prevent the possibility of any undestroyed deleterious or offensive gases escaping from the chimney shaft. For this purpose a forced draught of either dry air or steam is necessary.

(3) The main flue should have a large sectional area so that the heat and fumes may travel slowly, and thus maintain greater heat in the chimney.

(4) Dust screens are ineffective for the purpose for which they are designed, and, in a properly designed destructor, are unnecessary.

(5) The cooling influence of a boiler should not be introduced to the heated gases until they have fully performed their functions in the cells, and are on their way to the chimney shaft.

(6) The surplus heat should be as great as possible for application to any of the numerous uses already indicated, consistent with the efficient performance by the destructor of its primary functions as a refuse burner.

Old iron, tins, &c., may be sorted and disposed of where possible in the old metal market. Or, if it can be done profitably, the tins may be heated in a special furnace (a type of which has already been referred to) in order to recover the best tin and solder for re-use.

Considering the nature of the work, a destructor should be worked in three eight-hours shifts. A bath-room in connection with the works will be found a great boon by the workmen.

No destructor undertaking can be expected to be thoroughly successful unless intelligently and carefully worked, so as to derive the full advantage of its points of good design and construction.

The efforts of the stokers should be towards obtaining a good, hard, vitreous clinker which shall

[1] March 16th, 1896.

command a sale, or be useful for road-making and other purposes.

In the course of the inquiries of the recent deputation of the Cardiff Corporation, having inspected the refuse disposal of some fifteen districts, the experience gained led to the following general conclusions:—

(1) That destructor furnaces should be of the "high-temperature" type with forced draught.

(2) That, ton for ton consumed, the cost of destruction in high-temperature furnaces, including labour and repairs, is not greater, and possibly less, than in slow-combustion furnaces.

(3) That with the high temperature furnace (1) no cremator is required; (2) these furnaces are more suitable for generating steam power of a high pressure.

(4) That of the furnaces with forced draught, that of Messrs. Beaman and Deas, as seen at Warrington and Dewsbury, is the most efficient.

(5) That one great drawback to the destructor system is the creation of such large percentages (from 30 to 40 per cent.) of ashes and clinker to be disposed of subsequent to the burning. In nearly every town visited the getting rid of this large residue was no trifling matter, and in some cases amounted to a real difficulty incurring considerable cost.

(6) That as a result of these difficulties, some districts have resorted to the manufacture of artificial paving slabs, but these being only of a *third-rate* quality they could not recommend this method of utilising the clinker in a stone-quarry district, such as Cardiff.

(7) That clinker should not be used in forming road bottomings, owing to the damage sustained by water and other pipes in contact with same from corrosion due to chemicals existing in the ashes, &c.

(8) That the process most suited to their own district would be a combination of the separating plant as used by the Chelsea Refuse Disposal Company, including various machinery for manufacturing paper, crushing bones, &c., with the destructor system, and recommend the erection of a refuse destructor of the Beaman and Deas type for consuming the dust, animal and vegetable matter, diseased meat, infected bedding and clothing, &c. This combination they expect to be able to work at a profit.

The deputation found that in nearly every place they visited the person in charge of the works considered his method of disposal of the refuse and his type of furnace the best and unsurpassable. The opinions expressed in regard to the different types of furnaces were so utterly at variance that the members of the deputation were left to form their own conclusions more from what they *saw* than from what they had *heard*. Where low-temperature destructors were in use the manager, they found, advocated that particular class of furnace, and deprecated the use of high-temperature furnaces, as being expensive in repairs and more costly in working, requiring more firing and clinkering, &c., while the advocates of high-temperature furnaces allege that the fierce heat and forced draught throw off particles of silica in a melting condition, which adhere to the brickwork and preserve it; and so great is the growth of this incrustation, it has to be periodically knocked off.

THE END.

WHAT AND HOW MUCH TO EAT.

DR. SENECA EGBERT, in lecturing on the subject of "Food and Food Stuffs, Dietetics and Stimulants," in his hygiene and sanitation course at the Academy of Natural Sciences, Philadelphia, began by asking what we eat food for; and answered that we eat to live, save those of us who are so far on the wrong track as to make the old saw work the other way. First we eat to grow; and after that period we eat to make up for the destruction which is continually going on within us. So we eat first for growth, second for tissue, and third for heat and energy. Even when we do nothing the work of the heart alone is equivalent to going up a mountain 2500ft. high! Think of that!

Our diet should not be one-sided. We need all the foods; but not all at once, of course, though variety should be the spice of food, as it is of life. The proteids were considered first, and the fact that animals who feed upon herbs are rich in them was dilated upon. Indeed, wheat is rich in gluten; peas and beans, too. In the second-class came the carbohydrates, starch, and sugar; in the third, fats and oils; and in the fourth, salts. The old idea that proteids went to build larger bodies is buried, for every tissue doing work is full of proteids. The starch and sugar make the heat and energy. A working man needs more than an idle man, and both need more in cold weather than in warm weather. We need more fats and oils in winter also. We consume the fat quickest, and fat, be it known, is seldom taken in such quantities as to increase body fat. Any increase in fat in the ordinary person is due to the starches. Practically we need all four of these foods, though one or two may be dispensed with for a time.

As to the physiology of digestion, the body can use nothing that cannot become soluble. Many foods that present this difficulty are turned to sugar by the saliva. Test it by holding a bit of biscuit in the mouth; it will grow sweeter. The action of the gastric juice checks the action of the saliva, and when the food gets into the first part of the intestine, there is yet to be digested all the fats and a good share of the proteids. People don't thrive on digested foods, the girl without a stomach to the contrary, notwithstanding.

Dietetics is the science of keeping well or getting well on a food basis; and dieting rather than the use of drugs cannot be too strongly advised. We most of us have our peculiarities, and though a food is said to be all that is desirable, if it disagrees with us we must have the good sense to let it alone. If we do not, and also take into consideration our labour and the climate, there is trouble ahead. The lower animals may endure a monotonous diet, but human beings require variety. The more palatable the food is the more easily it is digested.

NOTICE.—The Annual Subscription to this Journal has been raised to 12s. 6d. to all NEW Subscribers. NO ADVANCE will be made to our friends whose names were entered on our Subcription list prior to March 31st, so long as they continue to Subscribe.

THE MANCHESTER REPORT ON SYSTEMS OF SEWAGE PURIFICATION.

(Continued from page 539.)

SUTTON SEWAGE WORKS.

The deputation visited these works on December 23rd, 1897, but in consequence of the lateness of the trains, owing to the prevalence of a thick fog, their intended programme was much disturbed, and the visit had necessarily to be of a very hurried character.

One member of the Committee (Councillor Maben) therefore visited the works the next day with a view of obtaining further particulars, and his report is here appended :—To Alderman Sir Bosdin T. Leech.—Dear Sir,—Having, by reason of the late hour of my arrival in London from Hendon Sewage Works, been compelled to stay another night in London, I resolved to utilise my time the following day (December 24th) by seeking further information on the subject from Mr. W. J. Dibdin, who, while he was chemist to the London County Council, promised me that he would show me the bacteria tanks at Sutton any time when I visited London. I called at his office; his partner (Mr. Thudichum) at once offered to escort me to the works, and we went direct to Sutton. We called on Mr. Chambers Smith, C.E., the Surveyor, who gave us the necessary permission to visit, and on our arrival at the works I found that the three bacteria tanks were in work, and the manager in my presence recharged one of these with crude sewage.

The following particulars I obtained on inquiry :—The population of Sutton draining to these works is 13,000. The daily dry-weather flow is 350,000 gallons. This is an average of 27 gallons per head, and its quality will perhaps be better understood if it is stated that the separate system of sewers operates, though in times of storm much subsoil water percolates into the sewage sewers.

These works, like many others, have undergone some changes in the method of treatment. They were originally built for the process known as "The International," but, except for the presence of a quantity of disused polarite heaped on the ground, and perhaps the outlet valves and pipes leading from the tanks, and a few pipe ventilators projecting from the ground at the sides of the small filter beds, there is nothing now left to indicate that that process had ever been in operation there.

The land comprising these works is about 25 acres in extent, and appears to be of a heavy clayey nature, entirely unsuited for land filtration without the addition of large quantities of cinders. After experiments the Council decided to change the filters to coke breeze, and also to construct others. It is one of the latter which Mr. Dibdin has frequently referred to both as to cost and capacity, and Mr. Thudichum pointed it out to me, and stated that its cost was only 4d. per superficial foot, or £726 per acre ; and on the question of capacity he was equally emphatic as to its ability to treat successfully and continuously a quantity of effluent equal to one million gallons per acre per day.

Prior to October, 1896, the whole of the sewage was treated by precipitation in six tanks, lime and copperas being used, and the sludge afterwards pressed ; but at that time the Council resolved, at the suggestion of Mr. Dibdin, to try the treatment of the crude sewage by passing it direct on to a coarse filter, and in November, 1896, one of the precipitating tanks (of which there are six) was used for this purpose, and after laying one 6in. centre main drain, and a few 3in. field drains laid herringbone, this tank was filled with burnt clay ballast to a depth of 3ft. 6in.

The figures of capacity given to me were :—Area, 183 superficial yards ; cubic capacity, 218 cube yards ; water without ballast, 36,094 gallons ; water with ballast, 13,500 gallons.

This process of formation was completed on November 21st, 1896. It was then filled, and has continued working ever since. It takes about three-quarters of an hour to fill, and about one and a-half hours to empty, and the crude sewage is allowed to lie in darkness two hours, and then drawn slowly off. The filtrate from this first process was apparently clear, but Mr. Thudichum assured me that it was not yet fit to go into a stream of small volume, and consequently it is run upon another bacteria bed of finer construction, of coke breeze or clinker or burnt clay, and I drew a sample of this, which appeared brighter and clearer than any filtrate I have ever yet seen. The Urban District Council are so satisfied with this method that they have turned two more of the precipitating tanks into use as bacteria beds, and have got the same result, and in a short time they will have abolished all their precipitating plant, and be able to dispose of all machinery and mixing gear, and also the sludge presses.

There are now three bacteria tanks in use. No. 1 was started on November 21st, 1896, and has since treated 12 million gallons. No. 2 was started on June 3rd, 1897, and has since treated 5½ million gallons. No. 3 was started on July 23rd, 1897, and has since treated 5 million gallons—total, 22½ million gallons ; and as the average of this sewage contains 60 grains of suspended matter per gallon, there has been got rid of without any trouble no less than 800 tons of sludge, containing 90 per cent. moisture. Each of these bacteria beds is stated to be as effective now as ever, and free from nuisance, and with a depth of 5ft. The Surveyor informed me that their working capacity was one million gallons per acre per day.

Plans are now prepared for the complete conversion of these works to this bacterial method, and it is estimated that on a daily flow of 350,000 gallons the saving effected to the ratepayers in working expenses will be £560 per annum.

Three acres of the farm are successfully appropriated to the growth of peppermint, which after distillation was found to have yielded a profit of £20 per acre.

Another kind of filter has been erected here, and is on the same principle as that at Hendon, which is the invention of Colonel Ducat , it is 300 yards super in area, but as it is under trial I can only refer you to my notes on the visit to Hendon Works. I may say that every facility was afforded to me of a complete inspection of the works without reserve of any kind. W. MABEN.

Sutton Sewage Works.—No samples were taken on this visit, and we therefore have no chemical data on which to base conclusions.

Report as to Cost and General Working of Filters.—This place is a centre of attraction for all students of the biological method of treating sewage, and is visited constantly by deputations.

The District Council has made experiments with many kinds of filters, and is so satisfied with the biological method that it has decided to convert the whole of the works to this system. The Council is proposing to discard the system of precipitation with chemicals. The economy to be effected by this proposed change is estimated by their Surveyor at £560 per annum. The question of cost, capacity, efficiency, and endurance may be illustrated from the Sutton Works :—Cost of filters, 3ft. deep, filled with burnt ballast, is equal to £726 per acre, the lowness of this cost being due to the fact that the works are situate on a bed of London clay, which is burnt for ballast *in situ*. Capacity : One million gallons per acre per day. Efficiency : A filtrate sweet and non-putrescible. Endurance : After three years' work no repairs or renewals are needed.

HENDON SEWAGE OUTFALL WORKS.

Owing to the prevalence of a thick fog on December 23rd the deputation were unable to visit these works. One member, however (Councillor Maben), reached the works, and subsequently the City Surveyor inspected them. The accompanying plan was kindly supplied by Mr. S. Slater Grimley, A.M.I.C.E., the Engineer and Surveyor to the Hendon Urban District Council, who accompanied the City Surveyor to the works on January 11th, 1898, and fully described them to him. The following general description may be of interest :—

The sewage from a population of about 17,000 is at present dealt with, but the works were constructed for a larger population. The total capacity of the tanks is 677,380 gallons. The present dry-weather flow is 500,000 gallons per day. It is treated with ferrozone ; the Surveyor, however, states that the greater portion of the sewage will be treated by alumino-ferric or ferric sulphate during the ensuing year. The wet sludge removed from the tanks amounts to about 300 tons per week. The works were let for seven years to the International Sewage Purification Company, who worked them under contract until February, 1896, when the contract expired. The working of the system has since February, 1896, reverted to the District Council. The high and low-level filters, which have an area of four acres, are composed of burnt clay with a layer of soil over same, the surface being covered with Leighton Buzzard sand 3in. thick, and there is a polarite filter of 500 yards superficial area in addition. The District Council are about to enter into contracts for the construction of further filters to be worked on the intermittent system. The new filters will consequently be of water-tight construction, and the filtering medium will be burnt clay ballast and coarse pan (coke) breeze with a layer of sand on the surface. They will have an area of 800 yards superficial. The wet sludge is run over a portion of the land adjoining the works, and is subsequently dug in. The total area of land belonging to the District Council is forty acres. Of this nineteen acres has been steam ploughed and subsoiled to a depth of 20in. to 22in. Concrete carriers are about to be provided for conveying the effluent to this land.

The sewage is of an unusually foul character, owing to the large amount of laundry work done in the district. It is, however, free from manufacturer's refuse or other trade refuse. The City Surveyor took samples of the crude sewage entering the works and of the effluent. These samples have been analysed, with the following results :—

Description of Samples.

Sewage, January 11th.—Turbid yellowish liquid, containing heavy, dark brown precipitate about one-twelfth of volume of liquid.

Effluent, January 11th.—Bright and clear, very slight amount of suspended matter.

Analytical Numbers.

	Grains per Gallon.				
	Oxygen absorbed, 4 hours.	Free and Saline Ammonia.	Albuminoid Ammonia.	Nitrogen as Nitrates and Nitrites.	Chlorine.
Sewage (shaken)	11·20	4·90	2·17	...	...
Sewage (settled)	5·26	5·07	·66	...	14·9
Effluent...	·70	2·40	·13	·44	6·3

Incubator Test.—Three Minutes' Oxygen Absorption.

	Grains per Gallon. Before Incubator.	After Incubator.
Sewage (settled)	2·36	4·90
Effluent	·24	·39 (?)

The sewage had become very putrid after incubation. There was no sign of putrescence in the effluent. Owing to the small quantity of sample left to determine the low oxygen absorption, the number ·39 is somewhat uncertain, and is probably too high. A determination of nitrogen as nitrites and nitrates in the effluent gave ·44 grain per gallon.

A small experimental filter has been constructed on the Ducat principle. This apparatus was, however, undergoing alterations at the time of the City Surveyor's visit, and had but recently re-started to work. Therefore, samples of the effluent from it were not taken.

Hendon Sewage Works.—No full description of the details of the precipitation process has been furnished. The results appear to be satisfactory, but the sewage is of much the same character as at Friern Barnet, with the addition of refuse from steam laundries.

(To be continued).

CARBOLIC ACID AND SUICIDE.—At the present time Middlesbrough seems to be suffering from a visitation in the shape of a mania for committing suicide by drinking carbolic acid. The cases of death by this means that have occurred recently number five or six, of which three have been within the past few days. On Friday last another case was added to the list, when a young married woman named Barbara Ann Stephenson (22) died from the effects of taking carbolic acid the previous night. At the inquest a verdict of "Death from taking carbolic acid whilst temporarily insane" was returned.

HOUSES LET IN LODGINGS.

Dr. Francis J. Allan, M.D., C.M., D.P.H., F.R.S. (Edin.), the Medical Officer of Health for the Strand District, and one of the hon. secretaries of the Incorporated Society of Medical Officers of Health, has presented an interesting and thoughtful annual report to the Strand District Board of Works. It contains some unique features, the special tables being particularly useful for comparative purposes, and they will repay the evident amount of pains and time which must have been bestowed upon them. He says:—"The year 1897 was an exceptionally healthy one for the country as a whole, the death-rate having been only 17·4 per 1000. Compared with the average in the ten years 1887—96, this is a decrease of 1·2 per 1000. London, notwithstanding the great influx of visitors during this memorable year, had a death-rate almost as low as the rest of England and Wales. The Strand district also compares favourably with other years, and it must be encouraging to your Board to see, as the results of your labours in one of the oldest of metropolitan districts, a steady improvement in the health of its inhabitants. The reconstruction of the unhealthy area, for which parliamentary sanction has now been obtained, together with the street improvements which your Board has or is in course of effecting, will render material assistance in maintaining that higher standard."

The birth-rate for the Strand was 23·69 per 1000, and the death-rate 20·01 per 1000. Dr. Allan's remarks upon houses let in lodgings are well worth perusal. He says:—

In a report presented to the County Council by the Medical Officer for the county, dealing with an inspection of the houses let in lodgings in the several sanitary districts of London, he says, in reference to overcrowding, to prevent which is one of the objects of the bye-laws regulating these houses, that if it be permitted in a single tenement, the conditions which are introduced into the house with it soon render the house unacceptable to others than persons of the same class as in the overcrowded tenement; and thus houses come to be devoted—intentionally devoted—to the accommodation of a class of tenants who appear to be indifferent to conditions of dirt and overcrowding. The absence of control by the landlord renders control by the Sanitary Authority more necessary.

During 1897, the number of registered houses were increased by four, while four of those registered in the past are now shut up. Much good has been effected in raising the standard of cleanliness in many houses which, while not being insanitary in construction, were not originally built to accommodate more than one family; and even now, with fair use, need not become insanitary. The object of these bye-laws is to do two things, to prevent overcrowding and to make the persons living in the houses acquire cleanly habits. In order to efficiently check the former evil it is necessary that the registered houses be visited early in the morning or late at night. Mr. Murphy, in the report quoted from, says, "It is obviously desirable to keep within limits domiciliary visits to dwelling rooms at night time, but it is evident that visits at unusual hours are in some cases necessary."

The teaching of cleanly habits to adults who have never been accustomed to them may be thought to be a task unlikely to be successful, but the experience already gained in this district is sufficiently encouraging to lead the Board to extend the operations of these bye-laws to a larger number of houses in the future. It has, of course, to be recognised that the beneficial effects of such bye-laws cannot be obtained in houses which are in themselves or their surroundings sanitarily bad, and it must likewise be admitted that the habits of many of the people who have lived under such conditions will speedily reduce the most sanitarily constructed house to a state as objectionable as their previous abode, unless some power exists to gradually lead them into better ways. To an extent the bye-laws give the opportunity for this to be done; the weekly visit of the Inspector, together with the advice he is able to offer, has an excellent effect, especially when it is known that failure to adopt it may lead to an appearance at the Police-court. Fortunately, this last resource was necessary in only one instance in 1897, when Assistant-Inspector Chamberlain was assaulted on visiting a registered house, resulting in his having his cheek cut and a tooth knocked out. His assailant was fined £3 and costs at Bow-street Police-court.

Sanitary Authorities have not given much thought in the past to the instruction of the people in the elements of healthy living, they have been occupied more with larger schemes of undoubted importance; but it must be recognised that there exists a great mass of ignorance, which is responsible for much suffering and many deaths. I have pointed out in previous reports that the excessive mortality from measles, diarrhœa, consumption, and other diseases might be much diminished. The large number of children who die or who grow up weakly is largely due to ignorance on the part of those in charge. Circulars dealing with the dangers of measles and whooping-cough have been distributed in this district during the last three years, and a Sub-Committee of the Health Committee has been appointed to prepare circulars dealing with other matters. Instructions are also circulated by the Jewish Board of Guardians among the Hebrews, who, since the tailors' strike in 1891, have in increasing numbers taken up their abode in Soho. But, in my opinion, the "circular" should only be used as an adjunct to personal instruction, and not as a substitute. I believe much good might be effected by Sanitary Authorities if they were to secure the services of women with nursing experience, grounded in the elements of hygiene, who could go from house to house and talk with the women on such matters as the care of their children, the importance of cleanliness in and about their houses, &c.; who could visit workshops where women were employed, and who would thus be of valuable assistance in detecting conditions requiring the attention of the Health Department. Ladies have been trained for this kind of work, and are employed in several country districts under the title of "Health Missioners."

Paisley.—Measles continues to spread in the northern district. Over the whole town upwards of 400 cases have been notified. Fortunately the rate of mortality is low among the sufferers.

THE SLAUGHTER-HOUSE AS A FACTOR IN THE SPREAD OF DISEASE.

GENERALLY speaking the place for slaughtering animals for food may be divided into large abattoirs and local slaughter-houses. The former are usually located in cities. The latter are used chiefly by the meat dealers of the country towns, and the animals slaughtered at these places are generally, if not always, for local consumption. In this article it is intended to discuss only the local slaughter-houses in their relation to disease.

The first matter to notice in connection with this subject is that every slaughter-house is from the very nature of things a centre of disease, and naturally the poorer the condition of the premises the more dangerous they are. These facts will appear clear if one considers what takes place at one of these houses. Even if only a few animals are slaughtered each week, the total number may amount to several hundreds during the year. Some of the animals are surely diseased.

It is well known that tuberculosis occurs in cattle. Now, if one or two hundred of these animals are killed at a country slaughter-house during the year, it may safely be assumed that one or more of them are tuberculous. Feeding the offal of these tuberculous animals to pigs will transmit the disease to those pigs, and these animals when used as food may in turn transmit tuberculosis to human beings.

The country slaughter-house is also the centre of infection for a number of animal parasites which are injurious to live stock, or, in some cases, even to man, and which are spread by means of dogs. Anyone who has visited one of these places will have noticed that dogs soon discover the premises as a good place to obtain food. While eating the discarded organs, they infect themselves with several kinds of parasites, of which the following are the more important.

The *Echinococcus hydatid* is found in the liver, lungs, and other organs of cattle, sheep, pigs, and certain other animals. It varies in size from a small object as large as a hazelnut or smaller to a bladder the size of a child's head. This bladder contains numerous tapeworm heads, and when eaten by a dog each head produces a small tapeworm. The eggs of this tapeworm are in turn transmitted to the various domesticated animals and man, and give rise to hydatids.

The disease it causes can occasionally be cured, but in man it is said to be fatal in five years in about 50 per cent. of the cases. It can, however, be almost completely eradicated if slaughter-houses are properly cared for.

The thin-necked bladder worm is found in the body cavity, in the omentum, &c., of cattle, sheep, and hogs, and is quite common in some localities. It developes into the marginate tapeworm when eaten by dogs. The eggs of the marginate tapeworm are then scattered by dogs on farms, in the road, &c., and infect cattle, sheep, and pigs with the bladder worm. It occasionally causes the death of young animals, as the bladder worm cannot be reached with medicines.

The gid bladder worm is found in the brain of sheep, and occasionally in other animals, but, fortunately, it is exceedingly rare, if present at all, in this country. When eaten by dogs, it developes into a tapeworm which produces numerous eggs. The dogs scatter these eggs on farms, sheep become infected with them, and contract the disease of "gid" or "turnsick."

The first and most important proposition to lessen the danger due to the slaughter-house is to reduce the number of places at which slaughtering is allowed, compelling all the butchers of a given town to slaughter at the same place.

This suggestion will naturally not meet with the approval of all the butchers. The objection will be made that they have money invested in slaughter-houses, and that any change will mean financial loss to them. To this the reply is that all or nearly all the country slaughter-houses are buildings which are not of much value; they are cheaply built, poorly arranged &c.; and the temporary loss to be sustained by the butcher will be infinitely less than the loss sustained in the course of time by the community. Further, these numerous local slaughter-houses are menaces to public health, and under these circumstances a small financial loss to a few individuals cannot be taken into consideration.

Objection may be raised that one butcher does not care to be subjected to having his business open to the gaze of other butchers. This objection answers itself. There undoubtedly are butchers who would object to having other butchers see the class of stock they kill or raise, and the sooner the Health Authorities exercise some control over these dealers the better.

As a rule, there is little complaint against slaughter-houses in case the odour arising from them is not especially offensive. When complaint is made the butcher sometimes cleans up the premises a little, and the matter is dropped. From the above facts, however, it must be evident that the odour arising from a slaughter-house is insignificant when compared with the sanitary side of the question.

TIN-LINED v. LEAD PIPES FOR WATER SUPPLIES.

AN interesting experiment relative to the influence of water on lead pipes is cited by Dr. Meredith Young, M.O.H., Crewe, in his annual report. It appears that the architect of the Crewe Isolation Hospital in his specifications omitted to specify pipes according to the water regulations in force in the borough, and ordinary lead water pipes were in consequence put in. When his attention was called to the matter, the architect gave an estimate of the cost of substituting tin-lined pipes for the water service already laid throughout the hospital premises, amounting to £73 os. 5d. The matter was subsequently considered at a meeting, but was deferred in order that experiments might be made to ascertain the action, if any, of the Crewe water on the lead pipes. The then Medical Officer of Health, Dr. H. Jones, made experiments with lead piping as used by the hospital contractor, and with tin-lined water-piping obtained from the corporation plumber, these pipes being both exposed to the action of Crewe tap water for five days. It was found that the water had not acted upon either of the pipes. Dr. Jones gave an opinion based upon these and other experiments, that no ill-effects would arise from lead pipes being used.

The Market, Lighting and Water Committee, at

a meeting held February 16th, resolved that Dr. Percy Frankland be asked to make experiments as to the action of the Crewe water upon unlined lead water pipes. Dr. Frankland's report came to hand in due course, and was duly considered by the Market, Lighting and Water Committee. The report stated that the water contained the following in parts per 100,000 :—Solid matter, 18·30; total hardness, 8·9; temporary hardness, 4·5; permanent hardness, 4·4. "It is free from ammonia and nitrites, it is alkaline to methyl orange and alkaline to phenol-phthalein on boiling. There is, therefore, nothing in the composition of this water which would lead to its being suspected of plumbo-solvent action." Two series of experiments were made by Dr. Frankland. In the first series, U-shaped leaden pipes, of ½in. internal diameter and open at each end, were filled, some with Crewe water and some with Birmingham water, which last is well known to be without action on lead.

The water, after standing for a number of hours, varying from twenty-four to sixty, was examined for lead, and this was repeated a number of times. Nine sets of experiments were made on these lines. These experiments showed that the mean quantity of lead contained in suspension or solution in water so treated was ·0675 part per 100,000, equivalent to 1-21st of a grain per gallon. The largest amount of lead was dissolved during the first two days of experiment, after which it fell, and on the ninth day two pipes exposed to the action of the water for sixty hours dissolved only ·05 and ·04 per 100,000 of lead respectively. In the second series of experiments, new leaden pipes, 3¼in. internal diameter and 2ft. in length, were closed at one end and filled with water, which was poured off and tested from day to day, Crewe water being compared as before with Birmingham water. The mean quantity of lead dissolved in ten experiments in which the water was in contact with lead for twenty-four hours was ·085 part per 100,000, or about 1-17th grain per gallon. The mean quantity of lead dissolved in four experiments where the water was in contact with the lead for sixty hours was ·080 part per 100,000, or 1-18th grain per gallon. Dr. Frankland concluded from both sets of experiments "that the plumbo-solvent power of the Crewe water is practically nil, for the water even after sixty hours contact with the leaden pipe contained only a very minute quantity of the metal. The amount of lead found in the water tends to diminish as the age of the pipe increases."

From the results of these experiments, and from the chemical composition of the water, Dr. Frankland concluded that the samples submitted to him were practically destitute of plumbo-solvent action, and that the tin lining of pipes for the supply of water was unnecessary.

Dr. Young himself made a few experiments with ordinary lead piping and with a specially prepared lead which is extremely easily attacked by a plumbo-solvent water, and from these experiments, as well as from a chemical analysis of the Crewe tap water, he was able to assure this Committee that tin lining of lead pipes in the borough was unnecessary.

YARMOUTH.—The Town Council has decided upon the erection of an isolated group of lavatories at a cost of £400 at the Town Hall.

THE TUBERCULE BACILLUS IN MILK

IN his annual report on the health of Liverpool during 1897, which has just reached us, Dr. E. W. Hope, the Medical Officer of Health for the city, gives some interesting details in reference to certain investigations which have been made during the year as to the presence of the tubercle bacillus in milk supplied to the city. Ordinary samples, in readiness for, or in course of delivery, were taken for the purpose, and forwarded to the investigators with due care. A total of 295 samples were examined, taken either from cans in dairies and shippons, from railway cans on arrival, on delivery at hospitals, or from unmixed milk. The milk dealt with fairly represented the city supply. The samples were forwarded in bottles specially prepared, numbers were put upon each, and the bacteriologists, Professors Boyce, Delepine, Hamilton, and Woodhead, were not informed of the places from whence the samples came.

Since the value of investigations of this kind depends upon the methods employed, and on the care with which they have been carried out, the examiners explain in detail the processes adopted by them :—

(1) The parasite causing the disease, the tubercle bacillus, may be looked for in the milk by means of the microscope.

(2) The effect which the milk has on animals may be tested by direct experiment, either by feeding them with the milk in question, or by the injection of small quantities of the milk under the skin, or into the peritoneum (the membrane lining the abdomen). When tubercle bacilli are present in the milk *in sufficient numbers to be a source of danger*, tuberculosis will be produced in the inoculated animal.

Professor Delepine, in his report, explains the reasons why injection under the skin is preferable to injection into the peritoneum. The lesions which are the result of such inoculation can be clearly recognised from those which might have been produced accidentally in some other way. When proper precautions are taken the injection of material free from tubercle bacillus will not produce lesions which can be mistaken for tuberculosis.

Professor Delepine employed two guinea pigs for each sample, and although he has every confidence in the subcutaneous method of inoculation as a test, this has not prevented him from using other methods which might furnish additional information. His report includes tables showing the re-action, specific gravity, the amount of cream separable in a limited time by means of the centrifugal machine, the amount of sediment, the number of cells, and the total amount of bacteria present. The tables also show the time which elapsed, within a few hours, between the time of milking and the time of examination.

Adverting to the value of the microscopic examination, Professor Delepine observes that even if tubercle bacilli were equally distributed through tuberculous milk—which they are not—a very large number of them would have to be present before one could expect to find one bacillus now and again in the few drops of milk used for a microscopical examination, *e.g.*, to examine one ounce of milk, at least 500 microscopical examinations would be necessary, each one taking twenty

minutes to half an hour, and if there were, say, 100 bacilli in that ounce, five such examinations would be necessary before it could be expected that one bacillus could be discovered, yet one bacillus in each drop would represent 10,000 bacilli in a pint of milk.

The simplest method in microscopic examination is to cause the impurities to be separated as a sediment, by means of the centrifugal machine, and then to examine a part of that sediment. From this it will be evident "That whenever tubercle bacilli are discovered by the microscopic method, they must be in such abundance as to make the milk infectious in a very high degree. I may say at once, he adds, that out of some forty specimens of unmixed milk obtained at various times from tuberculous cows, I have found the bacilli abundant in microscopic preparations only in two cases, and in these cases the udder was much diseased."

These observations render apparent the superiority of the inoculation method, concerning which the professor observes that in order to avoid injecting too large a quantity, and also to ensure that the number of bacilli injected should not be so small that the animal might resist the tuberculous invasion, he has injected half of the sediment separated from about three ounces of milk, mixed with two c.cs. of the milk from which it had been separated, under the skin of one guinea-pig, and the other half of the sediment, mixed with five c.cs. of the same milk, into the peritoneal cavity of another guinea pig. The animals were then kept in separate, disinfected cages, in a warm, well-lighted, and well-ventilated animal-house. The results of the inoculations varied. In some cases the animal showed no ill effect; in a few the milk proved highly virulent (from causes other than that of tuberculosis), and killed the animal within forty-eight hours. Others died from accidental causes, unconnected with the inoculations, and the remainder were killed at varying periods up to seven weeks, and a careful *post-mortem* examination was made, the organs being examined microscopically.

With regard to the guinea pigs referred to as showing local reaction at the seat of inoculation, this indicates the presence of a very large number of micro-organisms, and that the milk was not fresh, and it will be readily understood that milk containing irritant organisms of this character would be likely to give rise to the fatal inflammation of the bowels in infants, which is so exceedingly common during the autumn months.

The investigations carried on by Professor Boyce and the other examiners were conducted with the same careful regard to every detail, and the method employed was much the same as that employed by Professor Delepine. In the early experiments the milk was centrifugalised, and the deposit utilised. In subsequent experiments the sample milk was used. With regard to the microscopic examination, although this was employed, for reasons already stated, entire reliance could not be placed upon it. Due care was taken to ascertain that the animal was perfectly healthy before inoculation, and that it was kept under healthy surroundings in an effectively-ventilated animal-house, the animal being isolated as soon as any abnormal symptom developed. Full antiseptic details were employed where requisite.

Professor Boyce calls attention to a possible source of contamination to which reference has already been made, viz., the contamination of the milk from without by the tubercle virus, owing to excretions from tuberculous cows becoming dried with the shippon, floating about as dust and settling on the milk. He calls attention to the extreme susceptibility of guinea pigs to tuberculosis, and to the difficulty of saying when an animal is suffering from incipient tuberculosis. In order to prevent as far as possible any fallacy on this point, all the animals used by him were kept under observation for a considerable time previous to their inoculation. He says, "The chief point to pay attention to is that of never accepting any positive result, unless, firstly, the bacillus be found at the point or points of inoculation; secondly, unless the lymph glands running up from the point of inoculation are enlarged and tubercular: and thirdly, unless the tubercle has shown itself within a reasonable lapse of time."

The results of the bacteriological examination, says Dr. Hope, are conclusive that the supervision exercised in the city has proved more effectual than that which obtains in the country, and it is also made clear by the results of this examination, that consumers are safer, so far as tuberculosis is concerned, with milk from city shippons than with milk sent in from the country. Nevertheless tubercle must be eliminated absolutely from the milk supply of the city, and the most likely means to effect this end are a rigorous application of the existing orders and bye-laws.

HEALTHY DWELLINGS AND SANITARY TOWNS.

AT the request of the Organising Committee of the International Congress of Hygiene and Demography, held at Budapest in 1894, Professor Corfield prepared a series of resolutions relating to the sanitary conditions of towns and dwellings. These resolutions were submitted to a special joint meeting of three of the sections of the Congress, and were the subject of a very animated debate. They were ultimately referred to an International Committee, consisting of the following members:—Professor Corfield, London (proposer), Dr. Pistor, Berlin (seconder); Herr Andreas Meijer, chief engineer of Hamburg; M. G. Bechman, ingénieur en chef des ponts et chaussées, Paris; Professor Fodor, Budapest; Mr. Arthur Cates, architect, London; Herr Berger, chief architect, Vienna; Herr Lindly, engineer, Frankfurt-on-Main; and Dr. A. J. Martin, member of the Consultative Committee of Public Hygiene of France.

The resolutions were revised by this Committee and were submitted to the International Congress recently held in Madrid, where they were adopted as resolutions of the Congress. They may be taken to represent the maximum amount of agreement possible at the present moment among sanitarians of different European countries. They are as follows:—

(1) That the general health of the population is improved and the spread of diseases prevented in towns and dwellings by the immediate removal of all foul matters, and by a copious supply of pure water.

(2) That the paving of streets should be smooth, and, as far as practicable, impervious, to facilitate

cleansing, and also to prevent contamination of the subsoil.

(3) Special measures should be taken in the construction of houses to prevent the access of ground-air and moisture to the floors and walls.

(4) House drains should be arranged so as to avoid stagnation of their contents, and to secure a rapid flow to the street sewer. They should be impervious to liquids and gases, freely and continuously ventilated, and provided with syphon-traps to prevent the access of foul air to the houses.

(5) The public sewers should be so constructed as to secure the rapid and uninterrupted flow of the sewage to their outlets. They should always be freely ventilated.

(6) The streets should be as wide as possible in proportion to the height of the houses; this proportion should be fixed in each locality, regard being had to local circumstances and to climate.

Every inhabited building should be well lighted throughout its whole depth and arranged so as to have an access of air from at least two sides.

(7) Special regulations should be made in each locality by the Public Authorities with the view of enforcing the practical application of the principles herein laid down.

Governments and municipalities should resolutely and energetically carry out the preceding recommendations, especially those concerning the healthiness of dwellings.

MOSS SIDE.—At a recent meeting of the District Council, Dr. Owens reported that during the four weeks ended May 14th there had been 46 births and 16 deaths. The death-rate was 7·7 per 1000. This was the lowest recorded in the district since he came into office, whilst the birth-rate was unusually high.

CHURCH SANITARY ASSOCIATION.—Dr. Norman Kerr presided last week at a meeting of the Association at the Church House, Westminster, when the following resolution was carried :—"That the thanks of the Church Sanitary Association be accorded to the Government and the Home Secretary for the proposed revolution in the procedure with respect to criminal inebriates, and that, in the opinion of this Association, this valuable Bill would be greatly improved if some enactment were inserted applying compulsory procedure in the case of non-criminal habitual inebriates."

THE REGISTRATION OF PLUMBERS.—On Friday afternoon last General Laurie, M.P., introduced to Mr. T. W. Russell, at the Local Government Board, a deputation of educationalists, who wished to place before him a number of modifications they desired to see introduced into the Plumbers' Registration Bill. It was pointed out that under the present form of the Bill there was a danger of an undue proportion of the representation on the Registration Council falling to the Plumbers' Company, while the deputation considered that as the technically educative authorities bore so large a part in educating the plumbers, they ought to have large representation. Mr. Russell, in reply, said there was no great urgency in the matter, for the Bill was very unlikely to become an Act of Parliament this session. He suggested that there should be a conference of those interested in the common object aimed at by the principle of the Bill.

Sanitary Inspectors' Associations.

NORTHAMPTONSHIRE AND DISTRICT.

A LARGELY-attended meeting of the members of the Northamptonshire and District Branch of the Sanitary Inspectors Association was held on Saturday afternoon, at the Northampton Town Hall. The Mayor of Northampton, Mr. W. P. Hannen, presided, and was supported by Mr. G. W. Branson (Chairman of the branch), Mr. T. G. Dee (Westminster), Mr. T. E. Tidman, C.E. (Hon. Sec. of the Association), the Rev. Dr. Cox, J.P. (Chairman of the Brixworth Rural District Council), Mr. W. Turnbull (Bedford), Mr. J. Wills (Kingsthorpe), Mr. W. Abbott (Hardingstone), Mr. F. Bayes (Wellingborough), Mr. R. Dykes (Northampton), Mr. B. Pyles (Quildon), Mr. J. W. Treadwell (Daventry), Mr. J. Prentice (Wellingborough), Mr. L. Foster (Ampthill), Mr. W. R. Wood (Northampton), Mr. H. Garratt (Duston), Mr. W. Smart (Dalton), &c. &c.

DR. PAGET, the Medical Officer of Health for Northamptonshire, wrote regretting inability to attend.

The MAYOR, in opening the meeting, spoke of the important part which sanitation played in the health of a district, and of the usefulness of an association of Sanitary Inspectors.

Mr. BRANSON, in the name of the branch, welcomed Mr. Tidman and Mr. Dee.

Mr. DEE read a paper on "The Necessity of Unity Among Sanitary Inspectors." Unity among Sanitary Inspectors, he contended, was absolutely indispensable, for real unity would be beneficial not only to themselves, but also to the public, whose servants they were. United they could have more chances of successful endeavour to obtain laws, a more equal enforcement of the law as it stands at present, a free hand and a full responsibility to deal with conditions inimical to public health which they found in the course of their work, a fair salary and a safe tenure of office, and a certainty that for the future, should it come to them, when, after having given their best years to the public service, their resting time arrived.

Mr. TIDMAN followed with a paper on "The Sanitation of Country Houses, Villages, and Small Areas," in which he dwelt at some length on the principles which should be adopted, urging that, so far as possible, drainage should be kept outside the house, and there should be access chambers to all parts.

[We shall publish this paper in future issues.]

On the motion of Mr. SMITH (Irchester), seconded by Mr. TREADWELL (Daventry), a resolution was unanimously passed recommending Local Authorities to pay the expenses of the chairman or members of their respective Sanitary Authorities, and also of their Sanitary Inspector, in order to allow them to inspect various systems of drainage.

During the day six ordinary members and seven honorary members of the branch were elected, and the meeting terminated with thanks to the Mayor for presiding. Prior to the meeting the members of the branch dined together at the Black Boy Hotel, the Mayor of the town being in the chair.

General News.

ST. IVES.—The erection of an isolation hospital is under consideration.

BANGOR.—About £2000 will be borrowed from the Board of Works for the water mains.

LEAMINGTON.—Additional conveniences are to be erected at the Pump-room at a cost of £100.

HEDON.—The Town Council is desirous of joining Preston in procuring a pure water supply.

BAYFORD.—The Local Government Board has sanctioned the borrowing of £1600 for works of water supply.

MEOLE BRACE.—A Local Government Board inquiry has been held into an application for power to borrow £400 for water supply.

KEYNSHAM.—The Medical Officer of Health reports an outbreak of measles at Saltford, where eight families are affected by the epidemic, which includes twelve cases. His recommendation is that the local schools should be closed for three weeks.

STIRLING.—The County Council has referred to the Sanitary Committee to consider and report as to the advisability of fitting up a laboratory at the County Hall, and the appointment of a chemist to make analyses of water, sewage effluents, or other chemical investigations.

CROYDON.—At a meeting of the Rural District Council it was decided to take the necessary steps for obtaining a certificate at the earliest possible date from the Surrey County Council, authorising the adoption of the Housing of the Working Classes Act, 1890, Part III., with respect to the parish of Mitcham.

GLOSSOP.—At the last meeting of the Rural District Council a petition was received from the Leicester Board of Guardians calling attention to the proposal before Parliament to supersede the powers of the Boards of Guardians regarding vaccination. The members expressed their views against compulsory vaccination, and decided to give their support to the petition.

PERTH.—At a recent meeting of the Perth Water Commissioners the buildings for the new engines at the water-house were approved of. The addition consists of a new engine-house to be built to the south of the existing building. The elevation towards Marshall-place is carried out in the same manner as the elevation towards Tay-street. The plans have been prepared by Messrs. James Smart and Son, architects, Perth.

ROTHERHAM. — A Local Government Board inquiry has been held relative to the application of the Corporation for sanction to borrow £4000 for purposes of public baths. Ten years ago the baths were erected, and a loan was obtained amounting to £4100. Of this, there is still owing £3654. Practically ever since the opening ceremony took place serious leakages had occurred, owing to the foundations having given way, and in repairs and additions no less than £3345 had since been spent on the undertaking.

ROCHDALE.—The Corporation Water Bill, whose object is to enable the Corporation to buy up the Todmorden Waterworks, came before the House of Lords Committee last week. The Bill is opposed by the Todmorden Corporation on the ground that it is taking powers to provide works of its own. The borough of Dewsbury is interested in the scheme, and witnesses have been sent to London to give evidence before the Committee.

EDINBURGH.—In the course of last month the total seizures of unsound meat were 33, consisting of 8359 lb. of beef, 355 lb. of mutton, 68 lb. of pork, and 88 lb. of veal, making a total of 8870 lb. of meat condemned. Of that quantity 560 lb. of beef came from the country. There were eight cattle destroyed as suffering from tuberculosis, these having come from the country. No seizures of unsound meat were made in shops in the city.

LEDBURY.—The work of testing the yield of water at the bore-hole at Massington has been continued for a whole week without a break, and Mr. Berrington, the engineer, has now the satisfaction of reporting a good supply from that source. The depth of the bore-hole is 75 ft., and the actual number of hours the pumping was continued were 144, and during that time the yield of water was considerably over 133,000 gallons, the supply never once failing, the water keeping at a level of nearly 12½ft., which is equivalent to 1080 per hour.

WIMBLEDON.—AT the last meeting of the District Council a letter was received from the Local Government Board stating that the proposed arrangement of the isolation hospital appeared to be generally satisfactory. The Board asked the Council, however, to give an undertaking that instead of an unclimbable railing, as shown on the plans, a brick wall should be erected enclosing one portion of the grounds. It also asked for a detailed estimate of the cost of the proposed work and other information. The Surveyor mentioned that the cost would be nearer £15,000 than £10,000, which was the original estimate. The letter was referred to the Sanitary Committee. It would be interesting to know the reason for an advance of 50 per cent. on the original estimate. Perhaps it will be explained when the matter again comes before the Council.

ST. PANCRAS.—Mr. C. H. F. Barrett, Vestry Clerk of St. Pancras, in accordance with a resolution of the Vestry, recently sent a letter to Lady Henry Somerset, pointing out to her ladyship "that owing to the insanitary condition of a certain part of her property in Somers Town it has been condemned as unfit for human habitation, and that by order of the Local Government Board the Vestry of St. Pancras is compelled to undertake the clearance of the site, at a cost to the already overburdened ratepayers of £30,000, equivalent to a rate of 4½d. to 5d. in the pound. In this manner is the parish to be taxed for the faults of the freeholders, for it is solely due to their disregard of any other consideration than how to obtain from their wretched tenants the maximum of rents for the minimum of accommodation that the present disgraceful condition of things has come to pass. The Vestry ask her ladyship, in the name of justice, to contribute towards the compulsory improvement of her estate from the revenue she derives from St. Pancras."

SWANSEA.—A Local Government Board inquiry has been held respecting an application from the Corporation for permission to borrow another £100,000 on account of its new waterworks scheme at Cray. Mr. Jevons, deputy Town Clerk, explained that the Corporation was authorised by Act of Parliament to construct a water reservoir at Cray, to make a tunnel, and construct a line of pipes. At the present time it had simply carried out the laying of the pipes. The expenditure authorised by the Act was £270,000, which might be increased afterwards with the sanction of the Local Government Board. At the present time £97,406 had been spent on the laying of the pipes and the acquisition of the land, &c., which left £172,942 in hand. The lowest tender for the completion of the work of constructing the reservoir was £255,747, and consequently the Corporation would require another £100,000.

Personal.

MR. A. S. ST. JOHN has been appointed Medical Officer for the sixth district of Bromley union.

MR. C. C. GARFIT has been appointed Medical Officer for the Glenfield district of Blaby union.

MR. C. BLACK has been appointed assistant Medical Officer of the workhouse of Sheffield union.

MR. WILLIAM H. TURTON has been appointed Medical Officer of Health for the urban district of Heanor.

MR. R. H. BARRETT has been appointed Medical Officer for the Gedney Hill district of Holbeach union.

MR. J. PAXTON has been appointed Medical Officer for the Hamsterley district of Auckland union.

MR. A. E. CARRUTHERS has been appointed Medical Officer for the fourth district of Bath union.

MR. THOMAS MOONEY has been appointed Inspector of Nuisances for the urban district of Pudsey.

DR. W. P. TURNER has been appointed Medical Officer of the West Ham union workhouse and school.

MR. HENRY SIMPSON has been appointed Inspector of Nuisances for the urban district of Worksop.

MR. EDGAR M. JENKINS has been appointed Medical Officer of Health for the urban district of Calverley.

MR. R. I. C. RODGERS has been appointed Medical Officer for the Habergham Eaves district of Burnley union.

MR. J. T. BAXTER and Mr. H. H. May have been appointed Sanitary Inspectors for the Battersea sanitary district.

MR. D. M. F. GASKIN, M.I.C.E., civil and consulting engineer, has been appointed consulting engineer to the Newton-in-Makerfield Urban District Council.

MR. W. S. DIBBS has been appointed Medical Officer for the Hedgerley district of Eton union.

MR. JOHN HUNTER, son of the late Mr. John Hunter, merchant, has been appointed manager of the Electric Lighting and Fitting Corporation, Liverpool. Mr. Hunter has for some time been the electrician to the Allan Line Shipping Company, Liverpool.

Sewerage Schemes.

[TO MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

EXPERIMENTS in filtering at the Long Eaton sewage farm have been adopted.

THE Town Council of Chard has accepted the tender of Messrs. Vile and Son, Glastonbury, at £112 12s. 6d. for drainage work at Shepton Beauchamp.

THE Local Government Board has issued a Provisional Order empowering the Gomersal Urban District Council to purchase compulsorily land situate in the township of Birstall for sewage works.

A LOCAL Government Board inquiry has been held at Aston with reference to an application by the Urban District Council for sanction to borrow several sums, including £2500 for works of sewerage, and £200 for the extension of the public baths.

THE recent suspension of the local bank at Weymouth was as disastrous to the Corporation of that borough as to the residents. The former had a sum of over £8000 deposited there for the purpose of meeting the calls of the sewerage contractor, and it appears that the whole of this amount is irretrievably lost to the ratepayers.

THE Local Government Board has given its sanction to the Barton Rural District Council borrowing £1130, and the Urmston Urban Council borrowing £2,374 for the extension and improvement of the joint sewage disposal works at Flixton sewage farm. Mr. C. C. Hooley, C.E., surveyor to the former Council, has successfully completed the construction at Davyhulme of a bacteria filter bed to prevent the pollution of Bent-lanes brook.

THE Hendon Rural District Council has received a communication from the Local Government Board in reference to the application to borrow £2550 for works of sewerage at Harrow Weald, which stated that although the proposed works were satisfactory, the outfall works were quite inadequate to deal with the volume of sewage, and that extensions were contemplated. Until these works were carried out the Board defers giving a decision on the application.

A LOCAL Government Board inquiry has been held at West Bridgford with regard to the application of the Urban District Council for sanction to borrow several sums, including £4000 for an extension of the sewerage on the Holme-road, and the Radcliffe-road, and for a low-level sewer on the Rectory-road.

AT the recent meeting of the Staffordshire County Council, Mr. W. G. Bagnall, chairman of the Sanitary Committee, reported that the Council, in conjunction with the Birmingham City Council, was progressing favourably with the question of the pollution of the rivers. In the county at the present time there were schemes of construction amounting to £325,000. The Chairman said it was very gratifying that the Corporation of Birmingham was co-operating so cordially with them. The report was adopted.

THE progress of the experiments with the bacteriological method of treating sewage at Knostrop was considered at a recent meeting of the Leeds Corporation Streets and Sewerage Committee. Alderman Harding, chairman of the committee, commissioned to watch the experiments on behalf of the Corporation, reported on the work so far accomplished, and suggested the advisability of providing additional filtration beds in order to expedite the test. Having regard to the varied nature of the experiments, it was felt that by merely using the tanks now in existence too much time would be occupied in arriving at safe conclusions as to the efficacy of the Dibdin process in its application to Leeds sewage. Mr. Dibdin also communicated to the committee his opinion that shallower beds should be used. Up to date the expenditure on the experiments, including professional fees, amounts to rather less than £4000, and the committee decided upon a further outlay not exceeding £5000 to provide additional filtration beds.

THE Drainage Committee, reporting to the Hampton District Council at its last meeting, stated that Mr. Anstie had submitted further figures with reference to the application for an additional loan. It was resolved that the item of £400 still due to Mr. Dickson for extras should be left out of the estimate, and to apply to the Local Government Board for a loan of £4000, such sum having been rendered necessary by the Council having been obliged to purchase a site for the sewage farm and by other unforeseen contingencies. It was also reported that £711 remained due to Mr. Dickson as half of the retention money on his contract, but owing to the serious delay in the carrying out of the work it was resolved that he be informed that the sum of £840, being the penalty provided by the contract in respect to forty-two weeks, will be deducted from the retention money. It was further decided to accept the offer of the water company to flush the five riverside tanks at £4 10s. each, and that tenders be invited for the construction of the bacteria beds at the outfall works. It is possible that more will be heard of the decision of the Council with regard to the penalty withheld. The contractor has his views upon the matter, and at present these do not agree with those held by the Council.

A LOCAL Government Board inquiry has been held at Buxton with reference to the application of the Urban District Council for sanction to borrow £1020 for works of sewerage, and £500 for the purpose of contribution towards the cost of rebuilding Otter Hole Bridge.

A LOCAL Government Board inquiry was held at Withington on Friday last with reference to an application of the Urban District Council for power to borrow £421 for sewerage works on the Fielden Park estate. The Surveyor explained that the proposed works consisted of replacing the old sewer in Mersey-road with a new 12in. sewer pipe. The present sewer was open jointed, and was unprovided with manholes and ventilators. There had been serious complaints from residents in the neighbourhood. The Inspector, in closing the inquiry, said he would represent the urgent character of the case to the Local Government Board.

A LONG discussion took place at a recent meeting of the Sileby Parish Council, on the management of the Sileby sewerage disposal field, a large portion of which has been cleared and ploughed, and a layer of coke put down as a filter, whilst plans and details are being discussed as to a more successful mode of disposing of the sewage than has hitherto been in operation. As the Council considered that a definite arrangement had not been made with the Rural District Council with regard to the management of the field, the clerk was instructed to write to that body asking it to receive a deputation, so that the Parish Council might know its exact position and powers in the matter.

THE Sanitary Committee of the Pater Ward of the Pembroke Town Council recently had before it what may be regarded as the ultimatum of the Local Government Board. At the last meeting the Committee resolved to ask the Board to receive a deputation for the purpose of hearing objections to the amended scheme, which has for its outlet the Carr Rocks Spit instead of the Front-street outlet, as favoured by the Council, and adopted in the plans of Mr. Beesley, C.E., prior to the objections of the Admiralty, and also to discuss the question of damage to the oyster fishery. The Committee had received a letter from the Board refusing to receive a deputation, and asking that the amended plans be sent forthwith. After much discussion, in which the overbearing attitude of the Board was deprecated, a resolution was passed in accordance with the Board's demands. This will involve an expenditure (with water and present indebtedness) of no less than £80,000, including £4400 for the suburb of Bufferland, whereas the entire borrowing powers of the whole borough extend to only £72,000. The people of the town are for the most part artisans employed in the dockyard, and their incomes are not great. Consequently, unless the loan cannot be negotiated, because of the questionable security, the already burdened ratepayers will have to undertake an immense responsibility for the next thirty years.

Lighting.

AT a recent Colwall parish meeting it was decided to allow £42 to be spent for lighting the parish for the ensuing year.

THE Aberdeen Town Council has accepted the tender of Messrs. Siemens Bros. and Co., at £12,138 for the extension of the electric main cable to the harbour and west end of the city.

A LOCAL Government Board inquiry has been held at Chesterfield into an application by the Chesterfield Gas and Water Board for permission to borrow £1744 for gas and £662 for water purposes.

THE Town Clerk of Leeds has received from the Local Government Board an intimation that the Provisional Order enabling the Corporation to issue stock, irredeemable or otherwise, for the purchase of the undertaking of the Yorkshire House-to-House Electricity Company had been made, and would shortly be submitted to Parliament for confirmation.

THE directors of the new Monifieth Gas Company have just completed the feuing of the two acres of ground on the south side of the railway to the west of Lyell's Jute Works for the erection of the proposed gas works. The price is said to be 1s. 6d. per pole, a very reasonable arrangement. A lye will be provided from the railway adjoining, and no cartage will be necessary, thus saving a considerable item of expense. The directors are all members of the Burgh Commission.

IN connection with the proposed electric lighting at Llandudno, at a recent meeting of the Urban District Council, Mr. Johnson read the report of a deputation from the Council to the promoters of the light railway, from which it appeared that the company practically conceded all the points insisted on by the Council. In connection with this matter the Electric Lighting Committee submitted a report by Mr. Preece, in which he recommended the adoption of the overhead system for the proposed light railway in the district under the control of the Council. The report was adopted.

AT a recent meeting of the Shoreditch Vestry the Electric Lighting Committee presented a statement of accounts showing the work for the nine months ended March last. The power for the dynamos is obtained from the dust destructor, the consumption of coal being less than a ton a day. Altogether 491,107 units had been generated, of which 80,791 had been used for lighting the streets, 203,504 by private consumers, 156,725 used on the works, and 50,087 unaccounted for. The accounts showed a profit and balance of £1701 17s. 9d. The Vestry resolved to borrow a further sum of £15,700 for the purposes of the Committee.

A BILL to confirm the Provisional Order made by the Board of Trade under the Electric Lighting Acts, 1882 and 1888, in regard to electric lighting at Ilfracombe, came on Wednesday, the 18th inst., before the House of Commons Committee on Unopposed Bills. The preamble was proved, and the Bill ordered to be reported for third reading.

THE Salford Town Council at a recent meeting agreed, on the recommendation of the Electric Light Committee, to adopt plans for a new generating station on land in Strawberry-road, Pendleton, at an estimated cost of £28,000. Councillor Haworth, chairman of the Committee, said that the Committee was considering plans for the application of electric traction to the tramways. It had already gone as far as it dared in supplying the current to consumers. The proposed new station would not entail any charge on the rates, for as soon as they began working, interest and sinking fund would be provided out of the revenue. The electricty works were making gratifying progress.

THE foundation stone has just been laid of the buildings now in course of erection as an electric lighting station at High Wycombe. A site for the electric light station was found in a meadow adjoining Lily's-walk. The necessary buildings have been designed by Messrs. Moxham and Son, of Wycombe, and include a boiler-house, engine-house, accumulator-house, and various offices. The contract for their erection has been entrusted to Mr. Henry Flint, whose tender amounted to £2383. The fitting of the works with an electric lighting plant has been placed in the hands of Edmundson's Electricity Corporation, Limited. The fitting of the plant is under the supervision of Mr. J. C. Wigham, representing Messrs. Edmundson, and of the resident engineer, Mr. Fippard.

Law Cases.

IMPORTANT ACTION RESULTING FROM PTOMAINE POISONING.

(*Before* Mr. JUSTICE HAWKINS *and a Special Jury.*)

GILES *v* CHARD AND SONS.

THIS was an action brought by Dr. William Broome Giles, the plaintiff, against the defendants, who carried on business as butchers at 101, Gloucester-road, for damages for breach of contract in supplying to the plaintiff meat that was unfit for human food, in consequence of which the plaintiff and his household became ill. The action was consolidated with ten other actions which were brought by the different members of the plaintiff's household who were taken ill.

Mr. A. T. LAWRENCE, Q.C., and Mr. A. G. JAMES appeared for the plaintiff; and Mr. JELF, Q.C., and Mr. A. CARRINGTON for the defendants.

Mr. A. T. LAWRENCE, Q.C., in opening the case for the plaintiff, said that in July, 1897, the plaintiff occupied a flat at 169, Queen's-gate. On Saturday, July 3rd, the defendants, with whom he dealt, supplied the household with some ribs of beef weighing about 8 lb. The beef was cooked that

evening, and was consumed by the household on Monday, July 5th, and on Tuesday, July 6th. All the household partook of it except one young lady, and by Thursday, July 8th, all the household, including a dog, became ill, and were found to be suffering from ptomaine poisoning. The young lady who did not partake of the beef, however, did not become ill. A complaint was at once made to the defendants' foreman, who was at first disposed to meet the plaintiff and to pay any expenses to which he had been put, but when the plaintiff made a claim upon the defendants themselves they repudiated liability.

Dr. William Broome Giles, the plaintiff, said that his household in July consisted of his wife, his daughter, his mother, Mrs. Caroline Giles, Miss Williams, the governess, Jane Richards, the cook, Louisa Hart, the housemaid, Florence Hart, her sister, Catherine Isaacs, the nurse, a manservant, and Mr. Bacon, a guest. The witness had supper at home on Sunday, July 4th, but did not partake of the beef. On Tuesday, July 6th, he went to Lord's to witness the Oxford and Cambridge match. They had sandwiches for lunch made of the beef. He and his wife partook of them. He noticed that they were tasteless. He became ill during the night. Some of the symptoms continued for a month. His wife also was very ill. His mother, his daughter, the nurse, the housemaid, and the footman all fell ill, and their symptoms were identical with his own.

Cross-examined by Mr. CARRINGTON, he said that the defendants' foreman saw him with regard to the matter, and promised to pay any reasonable expense he had been put to. The foreman wished to have the remains of the meat examined, but it had then been eaten up. The dog ate the remains. No analysis of the meat, therefore, was ever made. It was on Friday, July 9th, that he first came to the conclusion that the beef was the cause. On that day he sent word to the defendants' foreman. It was said that ptomaines sometimes came into existence after the meat was cooked. On a hot day in a close place they might be so developed. The meat was kept in a meat safe at the back of the flat. The meat safe was in a small place or well surrounded by the building, which was seven storeys high. The witness's flat was on the first floor.

Re-examined by Mr. A. T. LAWRENCE, Q.C. He saw the dog ill on Thursday. It was almost paralysed. He continued to deal with the defendants because their foreman offered on behalf of the defendants to make reasonable compensation, and he asked the witness not to mention the matter to any one else in the building. In October he asked the defendants to make compensation. They repudiated liability.

Dr. Pierce Gould, of 10, Queen Anne-street, who attended on the plaintiff and his family on Thursday, July 8th, said they were suffering from weakness and feverishness, pains in the limbs, violent vomiting, and diarrhœa. These symptoms were consistent with ptomaine or food poisoning. The period of incubation of this form of poisoning was from four to forty-eight hours.

Cross-examined by Mr. JELF, Q.C.—The place in which the meat was kept was favourable to the development of bacteria. Bacteria might be developed in almost any article of food.

Re-examined by Mr. A. T. LAWRENCE, Q.C., he said that ptomaines were more liable to occur in diseased meat. At the stage when they were most poisonous it would be impossible to detect them by smell.

In answer to his LORDSHIP, he said that it was exceedingly difficult to test, by means of an analysis of the vomit, the presence of ptomaines. The witness did not think it necessary to make such an analysis.

Jane Richards, the cook, said that the meat arrived at about 5 p.m. on Saturday, July 3rd. The witness noticed nothing particular about it. She cooked it at once. She roasted it in the oven.

Mr. JUSTICE HAWKINS: That would be baked.

Mr. A. T. LAWRENCE, Q.C.: It is the modern way of roasting.

Mr. JUSTICE HAWKINS: It is a bad habit.

The witness, continuing, said that after the meat was cooked she put it in the safe. The meat was served in the dining-room for luncheon on Monday, and on the same day the servants had it for supper. The witness and one of the other servants partook of it. It was served again in the dining-room for luncheon on Tuesday, and sandwiches were made of it. It was finished off by the servants at supper on Tuesday. There were then present herself, Louisa Hart, Florence Hart, Catherine Isaacs, and Palmer. The dog had some at luncheon time and after supper on Tuesday. The dog was ill on Thursday morning. The witness began to feel unwell early on Wednesday morning.

Cross-examined by Mr. JELF, Q.C., she said she stewed the bones with some vegetables on Monday for soup. The soup smelt bad and she threw it away. She thought the smell was due to the vegetables. There was other meat in the house on Monday and Tuesday. There were two ducks, which came in on Saturday. They were finished on Monday. There was also a large quantity of bacon. The nurse, Catherine Isaacs, and Miss Violet Giles did not like bacon, and never ate it. There was also some steak, which was finished up on Sunday. At first it was suggested that the bacon was the cause of the trouble. The cider, too, was thought of. None of the vegetables used were tinned. The vegetables she put into the soup, which were carrots and turnips and onions, were not sent up for the table. The witness never served carrots with duck, nor with roast beef. The dust was taken away every morning in a zinc tin. It was taken down the lift in the "well." There was plenty of air in the well. Louisa Hart was taken ill at about twelve o'clock on Tuesday night. The last case of illness took place on Thursday.

Dr. Peter Giles, the plaintiff's brother, said he was now in charge of a militia hospital. He saw his mother, Mrs. Caroline Giles, on July 23rd, and found her to be suffering from the effects of an irritant poison. Dr. Hawksford Hincks and the witness treated her for ptomaine poisoning with success. The general opinion was that all meat contained ptomaines. With the development of bacteria a chemical change took place in the ptomaines, and they became poisonous. This happened most frequently when the animal from which the meat came was diseased. It was not always apparent. Bacteria were the products of putrefaction. Until the bacteria acted on the ptomaines there would be no indication of ptomaines. When the meat began to putrefy there would be marked indications of the ptomaines such as

a cook would be able to detect, provided that there was no fraudulent coating to conceal it, but at the early stages the ptomaines were not perceptible. Cooking would preserve the meat. There would be no smell before putrefaction set in. The periods of incubation of ptomaines which had come under the witness's notice were from 11 to 53 hours. These figures were based on cases which occurred in an epidemic which took place in Herefordshire in 1896.

Cross-examined by Mr. JELF, Q.C., he said that meat perfectly good in the hands of the butcher might become poisonous after its delivery to the customer. The place where this meat was kept was favourable to the development of bacteria, unless there were a draught.

Mrs. Giles said that the "well" was about 20ft. to 30ft. square. A door led into it on the ground floor from the street outside. This caused a draught in the well sufficient to bang the kitchen door. She ate some of the beef sandwiches for luncheon at Lord's on Tuesday, July 6th. She was taken ill on Thursday morning at about 2 o'clock.

Mrs. Caroline Giles, the mother of the plaintiff, said she was staying with her son in July last. On Tuesday, July 6th, she had luncheon with the plaintiff's daughter, Violet, and the governess, Miss Williams. All of them partook of the beef. The witness began to feel ill on Thursday afternoon. She was confined to her bed until July 19th.

Cross-examined by Mr. CARRINGTON: She could not say what she ate for breakfast or dinner on Tuesday. She was positive it was the beef that caused her illness.

Mrs. Brinsmead, *née* Williams, late governess to the plaintiff's daughter, said she partook of the beef on Monday, July 5th, and again on Tuesday. She began to feel ill on Wednesday evening about eight o'clock. On Thursday she felt sick, but went to 169, Queen's-gate. During the afternoon she became worse, and continued to be ill for some days.

Cross-examined by Mr. CARRINGTON: She noticed that the beef was nasty, tasteless, and of a dark colour. She did not complain. Governesses did not usually complain.

Mr. Harley Bacon said he was a visitor at the plaintiff's in July last. He was at luncheon on Monday, July 5th. He ate beef. He was taken ill on Wednesday morning. His illness continued for three days. With the exception of that luncheon he had not had meat at the plaintiff's house.

Cross-examined by Mr. CARRINGTON: Three days after he was ill he talked with the plaintiff and his family, and they came to the conclusion that it was the beef. He neither ate bacon nor drank cider at luncheon on July 5th.

Miss Rawlins said she lunched with the plaintiff on Monday, July 5th. She did not partake of the beef. She had duck and salad, and was not taken ill.

Mr. JUSTICE HAWKINS: That only amounts to an acquittal of the duck.

Louisa Hart, Florence Hart, Katrene Isaacs, and John Palmer all stated that they had eaten the beef, and were taken ill within two days afterwards.

Dr. Sidney Martin, Professor of Pathology at the University College Hospital, said he had made a study of bacteriology. Ptomaine poisoning was really a synonym for poisoning by food. It was not true to say that bacteria were always present in meat. Ptomaine was a word invented to indicate a poisonous alcaloid found in corpses. It was produced by bacteria. He never used the word himself, because it was not a correct term. Bacteria were living things, and ptomaine was a chemical substance. It would be impossible to come to any conclusion as to the time when a piece of meat became poisonous without an examination of the meat. It would be impossible to tell whether meat was poisonous until putrefaction set in. Poisoning by food was produced by changes in the food produced by bacteria. It seemed probable that unsound meat—meat of a diseased animal—would go wrong by means of bacteria sooner than sound meat. Heat, moisture, and dust were most conducive to putrefaction. The whole subject of bacteria and ptomaines was very obscure. The air, especially in London, was full of bacteria.

Cross-examined by Mr. JELF, Q.C., he said that there were two classes of poisoning by food. The first was when the bacteria had already developed in the food, and the second was when the bacteria developed after the food was consumed. In the latter case the period of incubation would be longer. The witness was further cross-examined with the view of showing that the fact that the period of incubation was prolonged in the case of the plaintiff and his household showed that the meat had not become poisonous while in the possession of the defendants.

Mr. JELF, Q.C., then opened the case for the defendants. Their case was that the meat sold to the plaintiff was perfectly good when it left their possession, and it was suggested that if the beef was the cause of the illness of the plaintiff and his family, it became bad while it was in the plaintiff's possession.

Mr. Alfred Chard, one of the defendants, said that the ribs of beef sold to the plaintiff on July 3rd were part of a hind-quarter and fore-ribs bought by himself at the London Central Meat Market on June 30th. It was Scotch beef, and was perfectly sound. He had disposed of the remainder and had received no complaints about it.

Before the defendants' case was concluded the jury interposed to say they had made up their minds, and found a verdict for the defendants.

Judgment was accordingly given for the defendants in this action, and in the ten other consolidated actions.

LONDON.—At the meeting of the County Council on Tuesday last, it was decided to advance the salary of Mr. Haward, Comptroller, from £1000 to £1250, an increase of £50 to be given at once, the remainder in two annual increments of £100 each. The highest testimony was given as to the value of Mr. Haward's services to the Council.

BATHFORD.—Another report has been presented to the Bath Rural District Council by Mr. E. H. Sheppard, the surveyor, on the question of the scheme for supplying Bathford with drinking water. He estimated that the cost, allowing £109 for contingencies, would be £1500, this including the expenses of a reservoir to hold 100,000 gallons, a wind engine, street fountain, &c. This report, with plans, has been remitted to the Parish Council for consideration.

Notes and Queries.

[Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C.

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

1088. — CALCULATION OF CUBIC SPACE: BOOKS ON.—"W. W." writes:—"Can you please recommend me any book dealing with the measurement of contents of pipes and cisterns as regards quantity of water?"

Answer.—Either of the two following books will be found suitable, viz.:—Maxwell's "Calculation of Cubic Space," price 2s.; or Clarke's "Calculation of Cubic Space," price 1s. 0½d., obtainable from our office.

1089.—FOOTPATH: DAMAGE CAUSED BY TENANT.—"Surveyor" writes:—"My Council have not long ago put in repair a public footpath which runs through ploughed land. Subsequent to the work being done the occupier has damaged it very seriously by carting across it. Will you please state whether we have any remedy against him?"

Answer.—If the footpath was dedicated to the public, subject to the right of the occupier to plough through it or cart over it, there is no remedy against the occupier. If, however, there is no such right, the occupier may be indicted or proceedings taken against him under Sec. 72 of the Highways Act, 1835, for causing damage to the footpath.

1090.—DISINFECTANTS FOR FUMIGATING AMBULANCE.—"A. K." writes:—"I shall esteem it a favour if you will give me the name of any disinfectant that is not of a corrosive nature that might be used for the purpose of fumigation of an ambulance after the conveyance of infectious cases."

Answer.—An excellent disinfectant is that produced by the generation of formalin gas as described in our reply to Query 1079 in our issue of May 20th. Where this cannot be carried out we recommend disinfection by sulphurous acid gas, the process of which is described in reply to our Query No. 1092 in this issue. Our correspondent should procure Rideal's "Disinfection and Disinfectants," price 12s. 6d., wherein he will find numerous other methods of disinfection described.

1091.—DRAIN OR SEWER: PREMISES WITHIN THE SAME CURTILAGE.—"Subscriber" writes:—"Herewith I hand you sketch" (not reproduced) "of a block of property, consisting of seven cottages with gardens in front, spare ground and conveniences at one end, flagged footpath at back, and public roadway at other end. The dotted line from the back and end of house indicates probable course of stone drain from back houses to sewer in adjoining roadway. At the head of drain A the sinks of two houses discharge into it at B. A third house is similarly connected with the drain at C, in a fall pipe from the roof gutter, and at D it is probable the drains from the first houses join. The whole of the property is surrounded by a stone fence, and belongs to one owner. Query: (1) Is any portion of the drain a sewer, and if so, which? and would the Local Authority be liable for the repair or re-construction of any portion? (2) How would the word curtilage apply in the case like the one shown?"

Answer.—We have previously referred to the unsatisfactory state of the law in regard to combined drainage. By Sec. 4 of the Public Health Act, 1875, "drain" means any drain of, and used for, one building only, or premises *within the same curtilage*, and "sewer" includes sewers and drains of every description except drains to which the drain interpreted as aforesaid applies. In the case put before us by our correspondent it is necessary to determine whether the premises drained by the combined drain are within the same curtilage. We are of opinion that the premises are within the same curtilage, and that the drain in question is not a sewer vested in and repairable by the Local Authority. Reference should be made to our answer to Query No. 1019, in our issue of April 1st, wherein we cite the three leading cases on the subject of combined drainage.

1092.—DISINFECTION: THE HG Cl_2 SPRAY AND THE SO_2 PROCESS.—"T. L." writes:—"Will you please inform me what is meant by disinfection of rooms by (1) the Hg Cl_2 spray, and (2) by disinfection of rooms by "the SO_2 process?"

Answer.—(1) We have described in answer to query 1095 in this issue the method of disinfecting rooms by spraying, which is carried out by means of the Equifex sprayer. The term "Hg Cl_2 spray" refers to the application of perchloride of mercury or corrosive sublimate, as it is otherwise described, as the particular disinfectant with which the vessel is charged, the liquid being sprayed on the walls and ceilings after cases of infectious disease. (2) The "SO_2 process" is the disinfection of rooms by sulphurous acid, or more accurately, sulphur dioxide, which is a gas formed whenever sulphur is burnt in air or oxygen. This process is one of the most common, by reason of its cheapness and the ease with which it can be generated. The usual way is to take some roll sulphur, about 1½ lb. being allowed for every 1000 cubic feet of space, seal up the room by pasting paper over all crevices which would permit the escape of the gas, light the sulphur in an iron vessel under which is placed a pail of water to prevent the risk of fire, and let it burn. Sulphur candles made specially for the purpose, as Kingzett's patent sulphur fumigating candles by the Sanitas Company, Limited, are a convenient method of carrying out the process. Another and very convenient form is to procure it in a liquid form put up in cylinders as prepared by Messrs. A. Boake, Roberts, and Co., Stratford, London, E.

1093.—COMMON LODGING-HOUSE: BEERHOUSE.—"M. O. H." writes:—"Would a beerhouse letting lodgings to the poorer classes for short periods and who are strangers to one another inhabiting one common room be considered a common lodging-house, and thus come under the control of the bye-laws and the supervision of the Medical Officer of Health? Or would it be exempt from such control and be under the inspection of the police only?"

Answer.—There is no statutory definition of a common lodging-house. Whether a house is kept as a common lodging-house is in every case a question of fact for the determination of the justices. In Langdon *v.* Broadbent, 42 J.P., 56, 67, it was held that evidence that hawkers, itinerant picture-frame makers, chairmakers, musicians, bone gatherers, and persons suspected of begging, resorted to a house for lodgings and had their meals in the kitchen at the same time, paying 6d. per night each, is sufficient to establish that the house is a common lodging-house requiring to be registered under the Public Health Act, 1875. The fact of the house being kept as a beerhouse does not exempt it from registration and from the operation of the bye-laws as to common lodging-houses, and from the information furnished by our correspondent we should say that there is evidence that the house is kept as a common lodging-house, and should be made subject to the operation of the bye-laws relating thereto.

1094.—SEWERAGE: NUMBER OF HOUSES WHICH MAY BE CONNECTED TO 6IN. AND 9IN. DRAINS.—"T. L. H." writes:—"(1) For what number of houses will a 6in. sewer be sufficient when laid with a fall of 1 in 60, the houses in question containing two rooms on the ground floor and one w.c. of the slop-water pattern?

(2) What number of the same class of house will a 9in. sewer take? In both instances the sewers will be on the separate system, the existing sewers and drains being left to take surface water from backyards, streets, and fall pipes from the roofs."

Answer.—There are many formulæ and tables which are used for calculating the capacity and discharge of sewers. For the purposes of our correspondent we should recommend him Spinks' "House Drainage," 5s. The author has therein given a table showing the maximum quantity of sewage to be removed per minute from various types of houses and also rainfall to determine sizes of drains. Thus the maximum flow of sewage, exclusive of rainfall, to be provided for in a house with two rooms on the ground floor is calculated to be 2 cubic feet (or 13 gallons) per minute; the discharge from a 6in. pipe running full at an inclination of 1 in 60 is 294 gallons, and the number of houses which may be connected to such a drain is therefore 294 ÷ 13 = 22·6, say, twenty-two houses. (2) A 9in. sewer laid at an inclination of 1 in 60 discharges 139 cubic feet, or 866 gallons per minute. Taking therefore as before the maximum discharge from one house as 13 gallons per minute, the question becomes 866 ÷ 13, which gives 66·6 houses as the number which may be drained into a 9in. sewer laid at an inclination of 1 in 60, when all the rainfall is excluded from the sewers. The correspondent will also find Crimp's "Tables and Diagrams for Use in Designing Sewers and Water-mains," price 10s. 6d., of great assistance to him. Either of the books named may be obtained from the Sanitary Publishing Company, 5, Fetter-lane, E.C.

1095.—Disinfecting Rooms by Spraying: Principles and Method.—"J. W." writes:—"Will you please describe for me the principles and method of disinfecting rooms by sprayers, and the cost of same?"

Answer.—The disinfection of rooms after cases of infectious disease by spraying by means of a specially constructed apparatus, of which the Equifex sprayer (Geneste Herscher pattern) is the best known, the sole licensees and makers of which are Messrs. J. Defries and Sons, 147, Houndsditch, London, E.C., is held by many bacteriologists of repute to be much superior and more reliable than fumigation by sulphurous acid, chlorine, or bromine. The Equifex disinfectant sprayer consists of a strong metal reservoir, into which liquid disinfectant is poured; a hand pump by which air is compressed above the disinfectant; and extension tubes which may be of any length for projecting the spray against the surface to be disinfected. By working the hand pump the spray is formed and delivered against the walls of a room at a rate which can be controlled at will by the manipulator by turning an air cock. The fineness of division of the liquid enables the work to be done with the minimum amount of disinfectant. Any liquid disinfectant may be used for the purpose, and it is asserted that its use effects a considerable economy of expense and money over other methods. The cost, of course, varies with the disinfectant used. If perchloride of mercury, 1 in 1000 solution, is used, it is found that an ounce of salt disinfects more than 3000 square feet of surface. The time occupied in the operation is about an hour per 1300 super feet. This system of disinfection is adopted by the Paris Municipality in lieu of fumigation, and it is claimed that the occurrence of house epidemics has practically ceased through the prompt and rigid use of it, and epidemics are got under and arrested in a considerably shorter period than has previously been possible. It is asserted that fumigation by sulphurous acid is usually impracticable through the difficulty of keeping the rooms air-tight during the operation, and objectionable through entailing the disuse of the room for one or even two days. The cost of the Equifex sprayer is from £8 to £16, particulars as to which may be obtained from the makers.

1096.—Dismissal of Sanitary Inspector: Irregularity.—"Inspector" writes:—"The Rural District Council of X, without any reason, give their Sanitary Inspector three months' notice to terminate his appointment. The appointment is held subject to the approval of the Local Government Board, who pay half the salary. The Council in November last reappointed the officer for three years, which was confirmed by the Local Government Board. (1) Can the Council dismiss the officer without the sanction of the Local Government Board? (2) Can the notice be given any time, or should it not be given at Quarter-day? There was no stipulation on appointment. (3) What course should the Inspector take? (4) The officer holds the post of Highway Surveyor, from which he has been dismissed. If the Local Government Board refuse to sanction dismissal from sanitary appointments, and if the officer states he is willing to hold one without the other, would the Local Government Board approve?"

Answer.—(1) No. An Inspector of Nuisances cannot be removed under such circumstances from his appointment without the assent of the Local Government Board, as prescribed by Article 10 of the Local Government Board's General Order of the 23rd March, 1891. (2) It appears to us from Article 12 of the order referred to, that the Sanitary Authority are required to give six months' notice for the determination of his engagement. (3) The Inspector should address a letter on foolscap paper to the President of the Local Government Board, under cover directed to the Secretary of the Board, giving all the facts of the case as concisely and fairly as possible, and if, as so often happens, the Inspector is being treated unfairly in consequence of the impartial discharge of his duties, this should be narrated and the powers of the Local Government Board to annul the notice of dismissal invoked. (4) The Local Government Board have no control over the office of Highway Surveyor, and the fact that he has been dismissed from the Surveyorship would not affect their decision. The officer may hold the office of Inspector separately from the office of Surveyor. We shall be pleased to be furnished with further particulars, and assist our correspondent if desired.

Contracts Open.

The dates given below are the latest up to which tenders can be received.

Burghead (Scotland).—May 30th.—Drainage of Cemetery.—Mr. Geo. D. Gordon, clerk to the Committee.

Consett (Durham).—May 30th.—Drain, &c.—Mr. William S. Shell, M.S.A., architect and surveyor, Taylor-street, Consett.

Boston (Lincs).—June 1st.—Drain Works.—Mr. C. G. W. Phillips, C.E., Witham Office, Boston.

Knaresborough.—June 1st.—Sewers.—Mr. George Wilson, C.E., surveyor.

Southend-on-Sea.—June 1st.—Sewer.—Mr. Alfred Fidler, A.M.I.C.E., borough surveyor, Clarence-road, Southend.

Blaydon-on-Tyne.—June 2nd.—Scavenging.—The Surveyor, Council Offices.

Trealaw (Wales).—June 3rd.—Sewers, &c.—The Surveyor's Department, Council Offices, Pentre, R S.O., Glam.

COMPETITIONS.

Castletown (Ireland). — June 9th. — Sewerage Works.—The Guardians invite tenders from compe t engineers for preparing plans, specifications, and estimates for a scheme of pipe sewerage works for the town of Castletownbere. Sealed tenders, endorsed "Tender for Plans—Sewerage Works," will be received by Mr. M. J. Donovan, executive sanitary officer, Board-room, Workhouse, Castletownbere, up to twelve noon on June 9th.

Vacancies.

ASSISTANT ENGINEER (HOUNSLOW, June 1st).—For the Heston and Isleworth Urban District Council. Salary, £140 per annum. Mr. W. Augustus Davies, A.M.I.C.E., engineer and surveyor, Town Hall, Hounslow, W.

BUILDING INSPECTOR (SWINDON, June 7th).—For the Swindon New Town Urban District Council. Salary, £130 per annum. Mr. Henry Kinneir, clerk, Public Offices, Swindon.

CLERK OF WORKS (Knutsford, May 31st).—For the Bucklow Rural District Council. Salary, £2 per week. Mr. George Leigh, clerk, Union Offices, Knutsford.

CLERK OF WORKS (WARLINGHAM, SURREY, June 14th).—For the Croydon Town Council. Salary, £4 4s. per week. Application forms to be obtained at the Town Clerk's Office, Croydon, and to be sent to Mr. E. Mawdesley, town clerk, Town Hall, Croydon.

COUNTY SURVEYOR (LEWES, June 24th).—For the Roads and Bridges Committee of the East Sussex County Council. Salary, £400 per annum. Mr. F. Merrifield, clerk, County Hall, Lewes.

ELECTRICAL ENGINEER (LONDONDERRY, May 31st).—For the Corporation. The salary will be at the rate of £160 per annum. Sir R. Newman Chambers, town clerk, Guildhall, Londonderry.

GASWORKS MANAGER.—Mr. W. Selby, secretary, Gasworks, Yarm, Yorks.

INSPECTOR OF NUISANCES, &c. (UPTON-UPON-SEVERN, June 1st).—For the Rural District Council. The salaries will be as follows:—Inspector of nuisances, £100 per annum; sanitary surveyor, £15 per annum; and inspector of canal boats, £2 per annum. Mr. George Powell, clerk, Upton-upon-Severn.

INSPECTOR OF NUISANCES (WILMSLOW, CHESHIRE, May 28th).—For the Urban District Council. Mr. William Cobbett, clerk, Wilmslow.

INSPECTOR OF WORKS (LONDON, N.W., May 27th).—For the St. Pancras Vestry. Salary, £130, rising £10 annually to £150 per annum. Application forms to be obtained of Mr. C. H. F. Barrett, vestry clerk, Vestry Hall, Pancras-road, N.W.

SANITARY INSPECTOR (CAMBRIDGE, May 31st).—For the Town Council. Salary, 35s. per week. Mr. J. E. L. Whitehead, town clerk, Guildhall, Cambridge.

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THE

Sanitary Record,

JUNE 3, 1898.

Notes.

The Slight to the General Medical Council.

THE intimation by the Earl Marshal, that he was unable to accede to the request of the General Medical Council for an allocation of seats in Westminster Abbey on the occasion of Mr. Gladstone's funeral, on account of limits of space, undoubtedly came as a very painful surprise to the members of that august body. They felt, and we think rightly felt, that the refusal indicated a lack of the recognition to which the Council is entitled, as representing one of the great learned professions. When not even the president of the Council was invited, and

ample provision was made for the representatives of many bodies not of the chief importance, it could hardly be construed as other than a slight to the profession. It is a question of principle. The medical profession surely occupies a place of sufficient consequence in the national polity to be entitled to representation in all national functions; and the Council was therefore perfectly right in insisting that steps should be taken to ensure in future such recognition in State ceremonials as accords with its status and dignity.

The Question of Foreign Immigration.

There has been much talk for a number of years about the necessity for taking steps to restrict the tide of immigration of destitute aliens, which year by year floods our shores with a most undesirable class of population; but our legislators have been slow to give up the name which Britain enjoys of offering a free asylum to all the world. Our proverbial hospitality may, however, be carried a point too far, and within recent years this has been increasingly felt to be the case. The tide of foreign immigration has been steadily growing in volume, and has at last reached the dimensions of a serious evil. During the last seven years no less than 40,000 aliens have settled in this country, and the worst of it is that not only are the immigrants usually of the lowest type, but they congregate in particular localities—notably in the East End of London, where four-fifths of them settle—and they produce a very marked effect in lowering the standard of wages, lowering the standard of life, and helping to foster the growth of slums, all to the detriment of our own working population.

The Aliens Bill.

Other countries have long adopted legislative measures for their own protection, and now there is the prospect of our doing likewise. The Aliens Bill, which passed its second reading by a large majority in the House of Lords last week, is designed to regulate the immigration of destitute aliens by providing that at certain ports, which are to be designated by Order in Council, the Inspectors of the Board of Trade may board any vessel bringing immigrant passengers, and prohibit the landing of any alien who, on inspection, appears to be an idiot, insane, a pauper, or likely to become a public charge, or who is "suffering from any dangerous, contagious, or infectious disease." Such persons shall be sent back to the port whence they came at the expense of the owners of the vessel. This is not the place to dwell on the social or economic aspects of the question, but all sanitarians will at once note with especial interest the provision which relates to persons suffering from infectious disease. The Russian and Polish Jews who crowd yearly into the East End of London, and who constitute the greater proportion of the foreign immigrants, usually belong to a class that is singularly destitute of the most elementary notions of hygiene. They form a real element of danger to the people among whom they settle, both through overcrowding and through their insanitary habits of life; and it is only fair to our own countrymen that they should be protected from this danger. The Bill is not a Government measure, but it has the support of the Government, and though it has been subjected to hostile criticism in some quarters, the principle on which it rests is generally admitted to be beneficial, and there seems to be little doubt that the Bill will, in some shape or form, become law at no distant date.

The Plague in India.

Though there is an absence this week of precise information regarding the progress of the plague in India, there are indications that it is continuing to subside, and that the state of unrest among the natives is quieting down. One thing to be regretted is that the Plague Committee in Bombay has lost the able services of Sir James Campbell, who has for so long been the guiding spirit of its policy. After nearly thirty years of work in the Bombay Presidency, he retired from the service at the end of April. The value of Sir James Campbell's labours in Bombay, and in particular of the work he has carried through as chairman of the Plague Committee, it is difficult for us on this side to estimate at its true worth; but we may take the testimony of the *Times of India* as reflecting the best opinion of Englishmen in Bombay when it speaks of him as "one of the most high-minded and faithful servants that the State has ever had." He has been at the head of affairs during a singularly trying crisis in the affairs of the city, and how he has discharged his responsibilities we may measure from the words of Lord Sandhurst, the Governor, shortly before leaving India. "Whatever criticisms," he said, "may have been passed upon the Plague Committee, of this I am confident, that no more disinterested body has endeavoured to serve you, and Sir James Campbell and his colleagues are entitled to the greatest gratitude."

The Tenure of Medical Officers in the Highlands.

When we wish for examples of high-handed action on the part of Local Authorities towards their officials, we not infrequently have to look, not to the great centres of population, but to outlying districts and small rural parishes. The Parish Council of Stronsay, in the Highlands, recently gave notice of dismissal to their Medical Officer, and declined to furnish him with any reasons for their action. We are not acquainted with the precise circumstances and the merits of the case, but it seems on the face of it to have been a somewhat tyrannical proceeding. The Local Government Board requested the Parish Council for some explanation; but the point for Medical Officers to note is that in law the Parish Council were strictly within their rights, for the Lord Advocate stated in Parliament that he was not aware that the Medical Officer who was dismissed had any right of appeal in the matter. That may be so, but none the less does it seem to us a matter for reprobation that petty Local Authorities should take such a view of their powers, and of their duties towards their servants.

More Figures at the Water Commission.

The London County Council has a good champion of its views in Sir Alexander Binnie. There appears to be no limit to the facts and figures he is able to bring to the notice of the Royal Commission in advocating the obtaining of fresh sources for

supplying the metropolis with water. At the last sitting he set himself to prove that it would really be cheaper to go to Wales for these than to establish any more immense reservoirs near the banks of the Thames. His plan is to take 121 million gallons per day from the Yrfon and 44 millions from the Towy. The works in Wales—headworks and reservoirs—would cost £2,190,000. From these an aqueduct of 162 miles would have to be constructed to convey the necessary 200 million gallons per day to Elstree, where the terminal works would be situated. The aqueducts would cost £7¾ million, and filters and other works at the metropolitan terminus would require some £2,413,750. Parliamentary and law charges would swallow up three-fifths of a million, or a total of £14,112,000 for the entire works. In the opinion of Sir Alexander Binnie the Thames could not yield, at a reasonable cost, 147 million gallons in addition to the 185½ million gallons already sanctioned. To erect reservoirs at Staines to supply 300 million gallons per day would cost £15 million. These figures are "tall," but if either of the schemes are carried out we fancy they will be found under rather than over the actual cost. Yet something will have to be done.

The Building Catastrophe at Westminster.

The length of the inquiry and the serious nature of the verdict of the jury have caused a large share of public attention to be directed to the collapse of a large building at Westminster. Every one must deeply deplore the fatalities resulting from the calamity, but it seems that it was only something of the kind that could really demonstrate the unsatisfactory state of the law with regard to the erection of new buildings in the metropolis. Theoretically, a constant inspection should be made by the "District Surveyor" as a structure proceeds. But this officer occupies a curious position. Appointed by the Home-office, that Department has no control over him; he passes plans, for which he receives fees, and reports on them to the County Council or the Vestry. He may give directions or order modifications, but he has no authority to enforce them. Further, it appears that he has no power over the internal construction of a building; in fact, his position is most unsatisfactory, both to himself and to the Authorities he is supposed to represent. "What wonder, then," asks a writer in the *Pall Mall*, "if jobbery, scamped work, and rotten buildings result?" The County Council and Vestries should join hands in demanding a reform. Would it not be better if the Local Authority were made responsible for all new buildings within its jurisdiction?

The Vaccination Bill.

To read the statements of some persons with reference to the Government Vaccination Bill, a stranger would be inclined to think an attempt was being made to inflict some great hardship upon the community, or that "vaccination" was merely an experiment, and that a dangerous one. The truth is, some people have conceived a fanatical antipathy to Jenner's great preventive force, and will not admit the possibility of it being a blessing to the community. Hence we have a meeting or conference called, to which it is carefully arranged opponents of the Bill shall be the predominant influence, and then we are told the Poor Law Guardians of the country are "emphatic" in their "disapproval" of the measure. All this kind of thing is easily worked up, but we think it will have but little influence upon the Government. It is "too blatant," for whatever the Bill had been, the same people would have condemned its proposals. That there may be weak points in the Government propositions is possible; but the main object is to ensure the protection of the community from an insidious disease. Up to the present vaccination holds the field as the best protection against small-pox, and until the "anti" can produce a better the Authorities are justified in their desire to secure a more universal adoption of this "preventive."

A Charge of Heresy at Bristol.

Our attention has been directed to a recent utterance of Dr. Davies, the well-known Medical Officer of Health for Bristol, in which he sets forth some "unorthodox" views on the question of sewer ventilation. As a rule we are not much concerned when a man is accused of heresy; for it simply means that he has had the courage to express an opinion he has formed on a particular point, and which does not not quite coincide with generally-accepted theories. But, after all, we like to have a reason given for the "faith" proclaimed. Up to the present sanitarians, and especially those with special experience in sewerage work, strongly advocate the placing of ventilators throughout the line of sewers. Generally speaking this advice is followed; and, in fact, some difficulty would be experienced in persuading a Local Government Inspector to recommend the passing of any new scheme without them. But at Bristol this has not been done, and several inhabitants have recently pressed the Authorities to bring their drainage system into line with other usage. Naturally the Council seeks the advice of its Medical Officer, and his reply is, "Don't." Pressed for a reason, he is reported to have said that "He considers the ventilation of public sewers is unnecessary and dangerous." Now, this "pious opinion" may or may not be sufficient for the Bristol Councillors; but something more will be required by others before they accept this new doctrine and throw away the old dogma. Still, we are willing to be taught; and if Dr. Davies will go a step further, and give us the data upon which his opinion has been formed, we will gladly open our columns to him, in order that others may be led into the "new light" that he has found.

The Crypt of St. George's, Southwark.

Since we drew attention to the unsatisfactory condition of the Parish Church of St. George's, Southwark, an official inquiry has been held by a representative from the Home-office, and his report will shortly be made public. The crypt, however, formed the topic of a very heated discussion at the last meeting of the Vestry, one or two features of which deserve special attention. Nothing can be clearer than the unfair treatment of Dr. Waldo by some members of the Vestry. After the visit of the representative of the Home-office had been reported, the Chairman innocently asked the Medical Officer if he had anything fresh to place before the Vestry, to which

Dr. Waldo made the significant reply: "I am not allowed to present any report to the Vestry until it has been before the Health Committee." Later in the evening the Chairman intervened in the debate, and made a most bitter attack upon Dr. Waldo, making charges against him, which the doctor emphatically and categorically refuted. Notwithstanding this, the Chairman persisted in his statements. Happily, at least one of the members had the courage to protest against his ungentlemanly conduct.

An Unworthy Attack.

Our readers will readily understand the position of affairs. A Medical Officer has his attention called to what is believed to be a nuisance. In strict accord with the duties of his office he makes an investigation and gives a report. His experience and training enable him to appreciate the possible dangers arising from a continuance of the nuisance, and he is prepared to make recommendations for its abatement. But the Vestry declines to hear him, and, worst of all, the Chairman—who at least should be impartial, and give some amount of protection to the officers against attacks they are prohibited from repelling—forgets himself in such a manner as to outdo all others in bitterness of speech and unworthiness in the method of attack. We are glad to know that the incident is almost without precedent in the annals of local administration. At the same time it is intolerable that a conscientious public officer should be subject to such treatment because he seeks the well-being of his district in preference to currying the favour of a partisan Vestry.

Notification at Melton Mowbray.

We have before us the report of the proceedings at the last meeting of the Melton Mowbray Urban District Council. From these we gather that Melton occupies a peculiar position. In all the surrounding districts the Notification Act has been in vogue for some time, but for some reason the Melton Council had refused to follow the lead of its neighbours. Time after time the Medical Officer had urged its adoption, but without effect. At the meeting under notice a petition was received from doctors of the town pressing the Council to reconsider its decisions, and setting forth the various advantages to be gained through notification. One of the members backed up the petition in a common-sense, practical speech, in which he showed the benefits adjoining districts derived from the adoption of the Act, especially with regard to dairy produce, their principal industry. It was, however, of no avail. A majority of the Council refused to grant the prayer of the petition. It might, they said in effect, be all very well for the Act to be adopted by rural districts, for milk vendors in towns would not buy their milk from farmers in districts where notification was not carried out. Melton was a town, and therefore did not need such a certificate. But we have an idea that a large number of pork pies are supposed to come from this place, and it is well that retailers of these should understand that Melton Mowbray declines to protect itself from infectious disease, and that there is no guarantee that these pies are not produced on premises where such disease abounds. Eaters of pork pies are just as deserving of protection as consumers of milk, and perhaps those who manufacture them will see the wisdom of pressing the Council to grant the prayer of the doctors. One of the opposing speakers admitted that over £30,000 had been spent in sanitary improvements, yet he opposed the annual outlay of about £2 in protecting the people from the spread of disease. The paltry half-a-crown fee appears to be the bugbear, and sooner than spend it they would run the risk of an epidemic.

Municipal Dwellings for London.

Remedies for metropolitan overcrowding are only to be found in municipal dwellings, and it is satisfactory to find that the attention of the London County Council has at length been drawn to the inoperativeness of its past policy in this respect. A subcommittee of the Housing of the Working Classes Committee of the Council has for some time been engaged in reviewing the position, and a report on the subject may shortly be expected. Only by municipal competition in rents will the tumbledown tenements of East London be let at their proper value, and the necessities of the working classes to live near their labour will not be made the opportunity of rapacious landlords. But it is well known that the London County Council has failed miserably in its dwellings policy. Buildings of an unnecessarily expensive and ideal character have been erected in accordance with the dictates of Councillors with fads, and the natural result is, that bound with iron statutory obligations as well, the Council has found its dwellings a terrible financial burden, while the tenants themselves have not reaped the advantage which they ought to have reaped, from the fact that the municipal authority of London can borrow its money so cheaply, and have had to pay rents as high as they would in the case of ordinary dwellings. In this way the policy of the Council has defeated its own end, for it cannot lower rents and it cannot increase the accommodation by further buildings, and the municipal housing work of London has been at a standstill for some years.

The Overcrowding Question.

In East London the question of overcrowding is coming to the front in an unmistakeable manner, most of the Local Authorities showing a disposition to turn their attention to it in a practical manner. This is a subject which involves the problem of the hour—how to house the ever-increasing population of our large towns and cities. So far as the East End is concerned the difficulties are enhanced by reason of the local feature of a foreign element, which is every year becoming more and more pronounced. Various influences are at work which tend to raise rents and foster the consequent overcrowding, and startling statements of cases met with in the slums of St. George's (East) and Whitechapel—the home of the foreign immigrant—have arrested the attention of the Authorities. The remedy appears to be in the hands of the municipality in providing proper housing accommodation. Fines and imprisonment are useless, the efforts of the Sanitary Inspector to keep the surplus population moving supply no solution of the problem, and it is absurd to expect people to pay the exorbitant rents demanded.

THE CHEMICAL AND BIOLOGICAL ANALYSIS OF WATER.

By T. H. Pearmain and C. G. Moor, M.A.

Members of the Society of Public Analysts. Authors of "Applied Bacteriology;" "The Analysis of Food and Drugs," &c.

(*Continued from page* 559.)

MICROSCOPIC EXAMINATION OF SUSPENDED MATTERS.

Respecting the information that we may gain from a microscopic examination of suspended matters, it must be remembered that, while we may sometimes find such substances as epithelial scales, undigested muscular fibres, and the like, which may be positive evidence of pollution, yet in most cases such substances will be filtered out of the water if it has passed through earth; and as well water is by far the most frequent water sent to the analyst, he will only occasionally derive assistance from the microscopic examination of suspended matter.

To examine water for suspended matters it was generally the custom to set aside about 200 c.c. in a conical glass, and after the suspended matters had settled out to examine some of the sediment under the microscope. A more efficient plan than this is the use of the "micro-filter" described by Dibdin (*Analyst*, 21, 2), by which means the whole of the suspended matter may be rapidly removed from a considerable volume of water in a short time, and a tolerably exact estimation of its quantity arrived at. Dibdin first filters about 500 c.c. of the water to be examined through hardened filter-paper, and then washes the suspended matter retained by the paper into his "micro-filter," which is a narrow tube plugged at the smaller end with a mixture of clay and kieselguhr.

As ordinary filter-paper is made from linen fibre, one must be prepared to find linen fibres in water that has been examined in this way.

The *mineral matters* that may be found in water are sand, clay, oxide, &c., which will settle out on standing, and are of no hygienic importance.

The *organic matters* may be living organisms, animal or vegetable, together with animal and vegetable *débris*.

For the sake of convenience we divide them, as far as possible, into classes, giving their significance where it is known. Some of these—for example, desmids and diatoms—are found in the purest mountain water, and are rather evidence of purity than the reverse; and, speaking generally, the same may be said of most of the chlorophyll-containing organisms. *These remarks do not apply to sand-filtered water*, which ought to be *entirely free* from all kinds of suspended matter, and the determination of suspended matter, as suggested by Dibdin, is of itself a good means of keeping a check on the proper working of filter-beds.

ALGÆ.

Amphiprora ornata (1).

Amphora ovalis (2).

Both these organisms are diatoms. They contain chlorophyll, and are found in ponds and streams.

1

2

Asterionella formosa.—This organism belongs to the diatoms. It contains oils or fats in its ectoplasm, and produces a disagreeable fishy taste and smell in water. It is a rod-shaped body, somewhat dumb-bell shaped.

3

Beggiatoa alba (3).—This organism is characteristic of decaying vegetable or animal matter. It is distinguished by the bright grains (said to be sulphur) visible in the cells. It is common in sulphur springs, and so prevalent in polluted water as to have earned the title of the sewage fungus. It contains no chlorophyll.

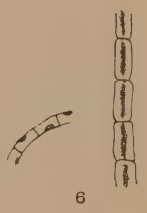
Cœleospherium (4).—This organism is mentioned by E. Waller, Board of Health Reports, Brooklyn, as producing a disagreeable smell in water.

4

5

Cladothrix dichotoma (5).—This alga is found in running or stagnant water. The filaments are harsh to the touch. It is common in the refuse water from sugar factories. In Russia it often occurs in town water supplies. It grows readily on the surface of putrefying animal or vegetable matter immersed in water. It has an avidity for iron, and sometimes forms obstructions in iron pipes.

Confervæ (6).—These are fili-form algæ, which are widely distributed in all ponds, rivers, and reservoirs, being especially abundant near the margins.



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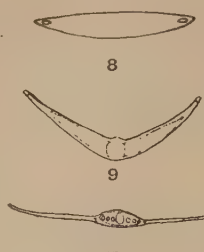
7

Cladothrix Kuhniana (7).—This organism is common in running or stagnant water that is rich in organic matter. The threads are motile, and in their younger stages are grouped into little patches. They have a greenish or brownish colour, and impart the same tint to the water. If a reservoir is infected with them, large quantitities of water may be deteriorated in a short time.

Closterium ensis (8).

Closterium dianæ (9).

Closterium rostratum (10).



These organisms are among the commonest of the desmids, and are often found in water supplies. Their presence is not objectionable, as they can only live in pure water which has plenty of air and sunlight. They all contain chlorophyll.

Gomphonema acuminatum (11).

Gomphonema capitatum (12).

Occur chiefly in pond water. They contain chlorophyll, and belong to the diatomaceæ.

Melosira granulata (13).—This diatom forms long filaments in water, and on account of oil or fats in its ectoplasm produces disagreeable grassy taste and smell in water supplies.

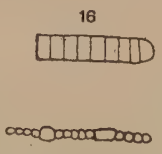
Navicula radiosa (14).

Navicula viridis (15).

These diatoms are motile, and contain chlorophyll of a dark-yellow colour.

Oscillaria (16).

Nostoc (17).



These organisms, which are anabœna, form blueish-green or brownish patches. They are chiefly found in stagnant water, and as they produce a disagreeable smell in water their presence is very objectionable on this account, and because they indicate the presence of a large amount of organic matter.

Protococcus viridis (18).—This is a very common inhabitant of streams and rivers, and probably assists in its self-purification. It propagates by fission, and is generally seen in groups of four.

Scenedemus (19).—This organism is common in ponds, but does not appear to possess any hygienic importance. It contains chlorophyll.

Spirogyra (20).—This organism contains chlorophyll in spiral bands and starch granules. It is a common inhabitant of ponds and streams.

Staurastrum gracile (21).—This organism is one of the commonest desmids, and its presence in water is not objectionable, in fact it is stated that it can only live in pure water which is well aërated and exposed to the light.

Stauroneus phœnicenteron (22).

Synedra pulchella (23).

Synedra ulna (24).

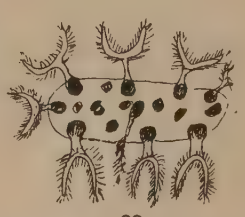
Both these diatoms are said to cause a disagreeable grassy taste and smell in water.

CŒLENTERATA.

Hydra vulgaris (25).—This organism is characteristic of stagnant water.

Polyps, *sertularia* (26) and *campanularia* (27).

Polyzoa, *lophopus* (28), *cristatella* (29).



These are low animals allied to the hydra, corals, and anemones.

(*To be continued.*)

RECENT DISINFECTION BY CHLORINE COMPOUNDS.

By S. RIDEAL, D.Sc. (Lond.)

DISINFECTION by chlorine, or its compounds, has always maintained a certain degree of favour on account of its efficiency and cheapness, but the objectionable odours and corrosive action of the class, the decided unpopularity of chloride of lime,* their chief representative, has led to their being overshadowed of late years by a multitude of coal-tar compounds, most of them decidedly not justifying the statements or testimonials with which they are issued. The faults of the phenol group have led to a recent revival of chlorine disinfection, as exemplified in the hermite process, electrozone, chloros, and chloride of lime itself. The reason of the general dislike to chloride of lime is not far to seek. Apart from the odour, which to many people is singularly disagreeable, its cheapness, and the lumpy character produced by its deliquescent nature, had caused it to be thrown in shovelfuls on iron gratings, which it rusted, or down the metal syphons of water-closets, which, whether lead or iron, it often pierced, and then to be washed away without dissolving, and therefore with only imperfect disinfectant effect. Disinfection carelessly or insufficiently done is worse than no disinfection at all, as it conveys a sense of a false security. The fact that chloride of lime requires to be well stirred with water before using, and that it deposits about 40 per cent. of insoluble matter, chiefly lime, has led to the re-introduction of hypochlorite of soda, which gives no such insoluble deposit. Each of these compounds is useful in its own way.

The Hermite process, in which electrolysed sea water, containing hypochlorous compounds, is mixed with sewage, was subjected to trial at Worthing in 1894, with results which provoked considerable controversy.

In an elaborate report by Roscoe and Lunt, of experiments at Worthing,† the main conclusions are that electrolysed sea water, when dilute, is very unstable, and requires to be used soon after preparation, that it fails to dissolve paper or solid fæces, or to sterilise the interior of the latter; that it is an excellent deodoriser, but is not by itself applicable as a process of sewage purification.

A hermite patent (Paterson and Cooper, 2197, 1896) proposes to prevent the loss of strength by adding a small proportion of soda or milk of lime. Crawford (14,852, 1896) strengthens the liquid by cooling during electrolysis. The *Lancet* found that full strength hermite fluid containing ·02 per cent. available chlorine was fatal to diphtheria and cholera bacilli.

"Electrozone" is a liquid similar to the Hermite prepared according to the Woolf process by electrolysing sea water or weak brine (2 or 3 per cent. NaCl), and was originally introduced in America. It is a yellowish fluid of chlorous odour, sp. gr. about 1·02, and contains hypochlorites and chlorides, the "available chlorine" from the former being, according to my analysis, about 0·355 per cent., or practically decinormal. It has been extensively used in the States for disinfecting and deodorising sewers, garbage, &c., and the reports of American chemists and bacteriologists are eminently favourable. At Brewsters, N.Y., it has been used for some years to purify a bad water, a portion of the New York City supply. E. W. Martin, Chemist to the Health Department, N.Y., states that 1 part to 100,000 of water "largely oxidised the nitrogenous organic matter, converting the greater part of the free and albuminoid ammonia, and all the nitrites, into nitrates. It also killed most, and, in some cases, all the bacteria."

A series of trials were conducted in 1898 by Professors Robinson, Kanthack, and the author as to the treatment with "electrozone" of the sewage effluent at Maidenhead. One part of the fluid was added to from 400 to 800 parts of effluent, the amount being regulated so that after the mixture had run through an open channel for two minutes, the liquid at the outfall still gave a blue colour with potassium iodide and starch. The chemical and bacteriological analyses agreed in showing that electrozone used as above has no appreciable effect on the organic matter in sewage, but that it has a marked germicidal action, and that if the organic matter be previously reduced by filtration, or by a bacterial process to a low limit, electrozone will produce an effluent nearly colourless, free from odour, and containing very few bacteria. "Meditrina" is a slightly stronger form of the above, prepared for medical and surgical use.

The reason for the small action on the organic matter was elucidated in the author's report. The sewage was found to require for complete oxidation about 11 parts of O per 100,000, whilst the amount of "available Cl" added was only about 0·55 parts per 100,000. As 35·5 parts of Cl have an oxidising efficiency equivalent to 8 parts of O, it will be seen that the amount of fluid added must be increased nearly one hundredfold to effect complete oxidation. This only supports what I have emphasised before, that although many disinfectants, *if used in sufficient quantity*, can kill bacteria and destroy offensive matter, the amount required is far in excess of what is prescribed, and becomes almost prohibitive as to cost. Chlorine and hypochlorites, and, indeed, other chemical disinfectants, practically fail when applied to the solid matters of sewage. Although the chlorine, when brought in contact with the germ, is capable of killing it, it only does so because it oxidises the organic matter in the germ; but, on the other hand, in presence of a large amount of organic matter the chlorine often expends itself on the latter before it has time to sterilise the organisms.

Inasmuch as all hypochlorite solutions are alkaline, and it is known that the growth of bacteria is encouraged by weak alkalies, and hindered by acids, it has been proposed to acidify these solutions so as to evolve chlorine or hypochlorous acid. Outenin-Chalandre (Eng. pat. 15,834, 1896) during the electrolysis of salt solution adds hydrochloric acid continuously. While, however, alkaline solutions tend to dissolve albuminoid matters, and therefore penetrate them better, free chlorine and HClO precipitate them, thereby being removed as an insoluble combination which crusts over the

* An example of this has just occurred. The Sanitary Inspector of Glossop reported that "he had tried chloride of lime, in accordance with recommendations, but had received scores of objections to it; in fact, it was a disinfectant which no one would use."—*Chemist and Druggist*, April 30th, 1898.

† *Journal* Soc. Chem. Ind., 1895, page 224.

larger particles, and may protect the interior.* "Chloros" is a solution of sodium hypochlorite, containing 10 per cent. of available chlorine. It is directed to be diluted with 100 volumes of water, which is about 0·1 per cent. available Cl.

Some recent investigations on the quantity of "available chlorine" required to produce an effect on organisms may be quoted. It must be repeated that organisms differ greatly in their resistant powers, a large number disappearing rapidly and with weak solutions, while spore-bearing forms like B. anthracis are most persistent, and that time, temperature, acidity, or alkalinity, light, nature of the matters in solution, and vigour of the culture used, play a most important part in the results, the interference of these factors accounting for the varying results sometimes recorded. A "reduction of the number of organisms" is often easily attained, whereas "absolute sterility" may involve perhaps a thousand times as much reagent, and an equivalent increase in the cost. In the following examples "Cl" means available chlorine, *i.e.*, that which is either free or belongs to the hypochlorites. "Parts" means parts per 100,000.

Kanthack in 1898 found that 0·3 to ·36 parts of Cl reduced the organisms in sewage effluents from innumerable to 10—50 per cubic centimentre.

In a laboratory experiment in the same year the author observed that when sewage was treated with 1·77 parts of Cl, although from 44 to 66 per cent. of this immediately combined with the organic matter, plate cultivations taken after 14 minutes' contact showed no growth at room temperature in three and a-half days.

Professor Delépine, of Owens College, finds that a 1 in 50 solution of chloride of lime (=0·661 per cent. Cl) disinfects tuberculous matter, while 1 in 10 (=3·3 per cent. Cl) kills anthrax spores in a very short time, and that the latter solution will keep in the dark for over twelve months. A liquid of 1 in 50, or even 1 in 100 strength, is syringed over the walls, and the room closed till the next day. Drs. Sims Woodhead and Cartwright Wood have repeated and confirmed Delépine's results, which may also be illustrated by the earlier work of Nissen and Bolton. The former found as the effective times and strengths: †

Organisms.	Time in minutes.	Bleaching powder, per cent.	Available chlorine, per cent.
Typhoid and cholera	5	0·12	0·04
Anthrax *bacillus*	1	0·10	0·033
Staphyl. pyogenes aureus	30	0·2	0·066
Anthrax *spores*	30	5·0	1·67
" "	70	1·0	0·33

Bolton states that 1 in 2000 of chloride of lime (=0·017 per cent. available Cl) destroyed typhoid and cholera germs in two hours, while anthrax spores required a 1 per cent. solution (0·33 per cent. Cl).

Dr. Porter has carried out disinfection by 1 per cent. chloride of lime at Stockport for the last three years.

Prof. Boyce states that 3 per cent. of sodium hypochlorite solution (= 0·3 per cent. of available Cl) killed B. coli, typhosus, and Sp. choleræ in broth cultivations in two hours, but not B. anthracis when spore-bearing. One per cent. (0·1 per cent. Cl) in two hours killed all except B. subtilis and anthracis.*

Dr. G. C. Clayton further found that anthrax spores required 2·5 per cent. Cl acting for thirty minutes, adding that 5 per cent. Cl acted in one minute, 0·5 per cent. mercuric chloride in the same time, while phenol failed to sterilise.†

In Dr. Klein's experiments,‡ sodium hypochlorite was diluted with definite volumes of sterile distilled water, and separate tubes inoculated with nine species of organisms including some anaërobic and spore-bearing forms. After definite times, sub-cultures were made, and incubated at 37 deg. Cent. for four days, (B. enteriditis at 20·5 deg. Cent. for six days). "By this time any living microbes would have had ample time and opportunity of producing easily visible growth." The non-sporing microbes were killed by 1 in 200 solution (= 0·05 per cent. Cl) in five minutes, while weaker solutions required an exposure so long as to be impracticable. Anthrax and enteriditis were killed by 0·1 per cent. Cl in 1½ hours. In sewage 1 of hypochlorite in 100 of fluid destroyed all non-sporing microbes in ten minutes, B. mesentericus apparently in thirty minutes.

* Haüssermann gives details of the cost of plant for electrolysing brine. See *Dingler's Polyt. J.* 1895, 296, page 189. See also Schoop, *Zeits. f. Electrochem.*, 1895, ii. [10], 209.

† Nissen: Disinficierends Eigenschaft des Chlorkalks. *Zeit. f. Hyg.* viii., 1890.

THE MANCHESTER REPORT ON SYSTEMS OF SEWAGE PURIFICATION.

(Continued from page 564.)

CHORLEY SEWAGE WORKS.

THE deputation visited these sewage works on January 10th, 1898. They were met by the Mayor, the Town Clerk, the Borough Surveyor, and several members of the Chorley Corporation.

The town contains 5964 houses, and has an estimated population of 26,000. Upwards of four-fifths of the houses are at present drained on the conservancy system; the remainder, amounting to about 1190 houses, with a population of 5355, is supplied with water-closets. The sewers are constructed to take a portion of the rainfall as well as the sewage, and a stream is intercepted by the sewers. Overflows are provided, which come into use in times of storm.

The City Surveyor is informed that from 600,000 to 1,000,000 gallons of sewage reach the works daily in dry weather. The works are about one mile from the town, and are situated on six acres of land which was formerly used as a sewage farm. The system adopted is that of chemical precipitation, followed by downward continuous flow filtration. There are eight precipitation tanks, 90ft. by 47ft. 6in. by 6ft. 9in. in depth. The sewage is chiefly domestic, and contains no chemical or other manufacturing refuse. It is treated with ferrozone in the proportion of about 10 grains per gallon.

There are fifteen filters, 55ft. 6in. by 15ft. by 3ft. 3in. in depth. Twelve of these are composed of sand, gravel, and polarite. Two were formerly filled with sand, and one with sand and coke breeze. The material in the latter three filters has

* *Journal* Soc. Chem. Ind., May 30th, 1896.

† *Ibid.*

‡ *Lancet*, Nov. 28th, 1896.

been removed, and these filters have been recently filled with sand and magnetite. The treatment of the sewage is carried on during the day only, at night it is run into settling tanks.

The deputation were informed that the Corporation had difficulties in dealing with the waste water from the sand washing. Two men were employed in washing the filter sand, and the dirty water resulting from this work formally discharged into the effluent stream on its way to the river. The Ribble Watershed Committee used to take samples below the point where the water from the sand washing entered the effluent channel, with unfavourable results, and consequently the Town Council have recently constructed two large intercepting tanks for the storage of the foul water which results from the washings of the filters. This water is run back to a well, and from thence it is pumped into the precipitation tanks for re-treatment.

The cost of the buildings and works, exclusive of the new intercepting tanks and of the site, was £16,750. The new intercepting tanks cost £650, making a total of £17,400. Samples of the sewage and effluent were obtained by the Committee's chemist, and the following is his report:—

Description of Samples.—Two samples of sewage were taken, the second sample being darker and greyer in appearance than the first, which was more brown. Sample No. 1 was taken at 2.45 p.m.; sample No. 2 at 3.15 p.m. The tank effluent was bright and clear at first, but deposited a slight flocculent precipitate on standing: it was taken about 2.50 p.m. The sand filter washings contained, besides the washed-out sand, a considerable amount of brown suspended matter. They were sampled about 3.10 p.m. The filtered effluent was bright and clear, and remained so; it was taken about 3 p.m.

Analytical Numbers.

	Grains per gallon.			
	Oxygen absorbed, 4 hours.	Free and saline ammonia.	Albuminoid ammonia.	Chlorine
Sewage No. 1 (shaken) ...	5·68	1·57	·945	5·0
,, ,, (settled) ...	2·54	—	·35	—
,, No. 2 (shaken) ...	7·24	1·92	·805	5·0
,, ,, (settled) ...	3·74	1·82	·49	—
Tank effluent	·48	·425	·20	2·9
Filtered effluent	·13	·01	·035	3·5
Sand washings	1·94	·42	·74	—

Incubator Tests.

	Grains per gallon. Three minutes' oxygen absorption.		
	Before incubation.	After incubation.	Putrescibility.
Sewage No. 1 (settled)	·88	3·30	Very foul.
,, No. 2 ,,	1·44	4·12	Very foul.
Tank effluent	·16	·11	Putrescent smell.
Filtered effluent... ...	·06	?	No smell.
Sand washings	·70	·84	Smell badly.

The quantity of filtered effluent was too small to allow of an accurate determination of the three minutes' oxygen absorption after incubation. It remained, however, perfectly sweet. Though the tank effluent smelt unpleasantly on removing from the incubator, the amount of putrescence is very small compared with the settled sewage. The chlorine numbers, however, show that the tank effluent probably corresponds with a weaker sewage.

Samples were taken from the top and bottom of a long carrier, down which the filtered effluent was allowed to flow in a thin stream, in order to see whether any appreciable oxidation would be effected by the air. The numbers were as follows:—

	Grains per gallon.			
	Oxygen absorbed, 4 hours.	Free and saline ammonia.	Albuminoid ammonia.	Chlorine.
Top of fall... ...	·19	·027	·032	2·8
Bottom of fall ...	·13	·045	·027	3·2

There is evidence of a small improvement, some of the albuminoid being converted into free ammonia, but the change is not striking. A mixture of filtered effluent from the top and bottom of the fall was found to contain nitrogen as nitrates to the extent of ·40 grains per gallon.

Chemical Report.—This sewage is of a domestic character. The precipitant used, called ferrozone, is a crude sulphate of alumina, containing some sulphate of iron. Ten grains of this are added per gallon of sewage, being equal to about 15 cwt. per million gallons, which at the present price of ferrozone would cost about four times as much as the quantity of sulphate of iron used at Davyhulme. No lime is added at Chorley. The tanks are worked on the quiescent principle, allowing three hours' settlement as a minimum; whereas the tanks at Davyhulme are arranged on the continuous-flow system. Great attention is paid at these works to the washing of their filters, each filter being washed once a week by the upward flow of the effluent from two other tanks. The filters are given ample periods of rest, and it is stated that the whole series is capable of passing 1½ million gallons per day, giving a good effluent. The quantity at present passed over the filters is 1,000,000 gallons per twenty-four hours through 1500 square yards, which equals 666 gallons per square yard per twenty-four hours, or about 3,000,000 gallons per acre. Taking the flow of sewage at Manchester at 26,000,000 gallons per twenty-four hours, about nine acres worked at the same rate would be required for filtering the Manchester sewage effluent. The filtered effluent is of a good character. The chemical precipitation alone shows a large amount of purification, although the tank effluent is putrescent. The filters remove all liabilities of this kind. There is evidence in the filtered effluent of an improvement, through the subsequent aëration as it flows to the stream. The washing of the filters and the liquid coming from such washing seem to offer some difficulty in the method of purification.

Report as to Cost and General Working of Filters.—The result produced here by the filters is satisfactory, but their adoption in Manchester would involve a very large capital outlay, and also very heavy working expenses.

OLDHAM SEWAGE WORKS.

The deputation visited these works on Wednesday, January 12th, 1898. They were met by Mr. H. Law, M. Inst. C.E., the Engineer of the Works, and were afterwards joined by the Mayor and other

members of the Corporation and the Borough Surveyor.

Mr. Law kindly described the works, and subsequently supplied particulars of working and the appended plan.

The method of treating the sewage of Oldham at the sewage disposal works at Slack's Valley is as follows :—The sewage having passed through a screening chamber, in which the coarser solid matters are removed, receives first a dose of 3·7 grains of lime and afterwards one grain of protosulphate of iron for every gallon, and then passes a paddle-wheel by which a perfect mixture of the chemicals with the sewage is insured. Both the lime and the protosulphate are presented to the sewage in a perfect state of solution, and are automatically poured into it in the required proportion.

For the preparation of the saturated solution of lime, the lime is reduced to the state of cream of lime in one of Michele's lime mixers ; a regulated quantity of the cream of lime is admitted to the suction pipe of a centrifugal pump, by means of which one-twentieth of the sewage effluent is raised into a tank capable of containing 300,000 gallons. There are two tanks, so that one is settling while the other is supplying the clear saturated solution of lime to the sewage.

In the mixing room is a well communicating with the sewer, and containing a float, which rises and falls according to the greater or less flow of sewage, and by its movement regulates the height of a weir, over which the lime water falls into the sewer. In a similar manner a saturated solution of the protosulphate of iron is obtained by keeping a cage filled with the protosulphate immersed in a tank of water, from which it passes into the sewer through a hole partially closed by a conical plug, the height of which is dependent upon that of the float in the sewage well, and thus regulates the quantity of the solution of protosulphate mixed with the sewage.

Mr. Law is of opinion that by the ordinary method of mixing the sewage with cream of lime, it is quite impossible to determine the actual quantity of lime so used, which may be half or twice as much as intended, depending upon the varying consistency of the cream of lime. Furthermore, when the lime is supplied to the sewage in a state of perfect solution a perfect and intimate mixture takes place, every particle of the sewage coming into contact with the lime. The above referred-to float is connected with a self-recording gauge, by which the actual flow of the sewage is automatically and continuously recorded.

After the chemical treatment the sewage passes on to the precipitating tanks, of which there are twelve, each 125ft. long, 36ft. wide, and 6⅛ft. in depth, and containing 172,260 gallons. These tanks are worked on the continuous principle ; the sewage entering, and the effluent leaving, the tank over weirs the full width of the tank. One of these tanks was converted into an experimental filter, composed of a layer of 9in. of stones, about an inch in diameter at the bottom, and above that 4ft. of ashes—that is to say, cinders or clinkers from the mill furnaces, the larger lumps being broken into pieces not exceeding 1in. to 1½in., and the dust being separated by screening.

The effluent from the tanks is run on the filter until it just appears upon the surface ; it is then left for an hour in the filter, and the filtrate is then gradually drawn off, and an hour's perfect rest is allowed before again filling the filter ; and the filter is allowed one day's entire rest once every week. The results thus obtained were so satisfactory that it was decided to adopt the system for the treatment of the whole of the sewage, and about three acres of filters are being constructed.

The sides of these filters are lined with timber camp shedding, the filtrate is withdrawn through drains formed with agricultural drain pipes, and the effluent is conveyed on to the filter in wooden troughs. The depth of filtering material is 28in., and the results obtained are said to be perfectly satisfactory. The cost of these filters is about £700 per acre, which includes the cost of excavation and of puddling the weak parts of the ground. The crushed clinkers of which the filters are composed cost just under 2s. 6d. per cubic yard *in situ*. The above cost is exclusive of main carriers or roadways. These filters are filled and emptied twice in twenty-four hours.

(To be continued.)

THE PURIFICATION OF THE SEINE.

In a paper contributed to the *Bulletin de la Société d'Encouragemeut* M. G. Bechmann, the Chief Engineer of the Sanitary Department of Paris, gives a very full account of the methods and work which have been employed for the protection of the Seine from sewage contamination, and the measures which have been taken to develope the sewage farm system in the vicinity.

The supply of drinking water for Paris is brought from a distance, and the discharge of sewage into the Seine had no bearing upon that problem, but the foul condition of the river long ago called attention to the necessity of doing something, and in 1855, when the transformation of Paris under the energetic direction of Haüssmann was undertaken, measures were taken to prevent the discharge of sewage into the river within the limits of Paris.

This was accomplished by carrying large collecting sewers along each bank of the river to receive the discharges from the sewers which had formerly emptied directly into the stream, these collectors delivering the entire discharge into the Seine at Asnieres, below Paris, the bend of the river making this connection direct and convenient.

So far as the residents of Paris were concerned, this work, which was completed in 1867, was entirely satisfactory, but the increasing foulness of the river below Paris soon called for relief, and, after the troubles of 1870—71 were over, the sewage farms of Gennevilliers were started, and what was formerly a sandy waste was converted into a thriving market garden, while the river was also much improved.

Since then urgent efforts have made to extend the system, mainly through the efforts of the engineers of Paris, MM. Mille and Durand-Claye, but for a long time there was a most unreasoning opposition among the residents and property-holders of the department of Seine-et-Oise, who feared that their property was to be depreciated by the creation of an offensive nuisance. Prohibitory damages were demanded, and even the Local Authorities united with mobs to interfere with preliminary surveys ; hence it took from 1875

to 1889 to secure the passage of the necessary legislation for the construction of the great sewage works and farms at Achères, now completed.

Owing to the several bends in the Seine, the sewage canal by which the discharge is conducted to Achères crosses the river three times. At Clichy pumping is resorted to, four large centrifugal pumps, with vertical axes, each pump directly connecting to its own Corliss engine, lifting the sewage in order to give sufficient head to enable it to pass through a tunnel under the river. The pumping station is arranged to permit the installation of four additional pumps, which will ultimately provide ample capacity for double the existing requirements. The tunnel is itself an interesting piece of work, having been pierced through the bed of the Seine by means of the Greathead shield system, using compressed air and hydraulic pressure, the finished tunnel being lined with bolted cast iron sections.

The second crossing of the Seine at Argenteuil is by means of a handsome steel arch aqueduct bridge, a second pumping station at Colombes lifting the flow to the required height, from which the principal aqueduct at Achères conducts and distributes the sewage over the farm territory. A portion of the land at Herblay lying in another bend of the river required a third crossing, which was accomplished by a submerged syphon composed of two riveted steel pipes. This syphon was prepared upon the surface and then sunk to a foundation of piling at the river bed, the pipes being bedded and enclosed in concrete.

The completion of this great work practically takes all Paris sewage-discharge from the river and deposits it in a dilute and inoffensive form upon a sandy, gravelly tract, formerly worthless for agricultural purposes, and now rapidly becoming valuable garden land. The water, after it has filtered through the soil, is practically clean and pure, and there is not the slightest objection to its discharge into the river, where it finds its way only by the slow natural process of percolation through the porous soil.

The engineering details of this great work reflect much credit upon M. Bechmann and his assistant, M. Launay, for, although the general plans were executed practically as they had been conceived and arranged by MM. Mille and Durand-Claye, many important constructive features had to be devised as the work progressed. The entire operation of the system is even yet not complete, but it is expected that those who visit the Exposition of 1900 will find the Seine as free from contamination as if Paris were not situated upon its banks.

LONDON.—At the last meeting of the County Council a report was presented by the Public Control Committee stating that a circular had been issued to Local Authorities, calling attention to the seriousness of the smoke nuisance in various parts of the metropolis. Sir H. Poland remarked that a serious danger arose in the waterside parishes from the smoke emitted by the river steamboats. He moved that Committee take into consideration the propriety of making representations upon this matter also. He pointed out that to plead that smokeless coal was unobtainable was no answer to a prosecution under the Abatement Act. The Council agreed to the suggestion.

MILK ANALYSIS.

AT a recent meeting of the Nottingham section of the Society of Chemical Industry, held at the Nottingham University College, a paper was read by Mr. Samuel Trotman, the Nottingham Borough Analyst, on the subject of "Milk Analysis." In the course of his introductory remarks Mr. Trotman said that although the work of an analyst did not often lead to important scientific results, still it frequently happened that the accumulation of small facts provided matter of general interest, and acting in accordance with this belief it was his intention to lay before the meeting a few statistics in reference to the milk supply of the city of Nottingham. These, if not particularly striking from a scientific point of view, needed no apology when regarded from the standpoint of public health and economy. There were few natural foods more necessary than milk, and yet, strangely enough, there was none so readily taken without proper inquiry into its source of origin and conditions of production.

After alluding to the general belief that the constituents of milk were subject to considerable variation, whereas they were, in point of fact, remarkably constant and uniform, the lecturer gave some statistics in support of his contention. During 1895, for instance, Mr. H. D. Richmond, of the Aylesbury Dairy Company, had analysed some 24,662 samples, with the average result of a percentage of 3·84 of fatty substance, and 8·82 solids, not fat, while in no case did the percentage of fats fall below 3 per cent. Similar analyses of large numbers of samples in succeeding years gave almost identical results. From this it might reasonably be concluded that, without inflicting any hardship upon the producer, one might expect to find the milk supplied for the daily use of the public not much below the standard quoted. In Nottingham, however, this standard was far from being attained.

During the past eighteen months the speaker had examined 180 samples of milk, with the following average result :—Fat, 3 per cent.; solids not fat, 8·5 per cent. Of these samples only 35, or 19 per cent., reached the average of the samples analysed by Mr. Richmond. In nearly every case, too, the samples were mixed, and not the produce of any individual cow, so that the conditions were identical in both cases. Of the remaining 145 (adopted as a standard of purity 3 per cent. of fat and 8·5 per cent. solids not fat), 62 were deficient in fat and 73 contained added water, representing altogether 96 undoubtedly adulterated samples. This was noteworthy in view of the fact that, according to Mr. Richmond, it was exceedingly rare to find a genuine milk in which the fat fell below 3 per cent., while the same gentleman gave it as his opinion that the solids not fat below 8·5 were only 2·18 per cent. of the samples he analysed. The difficulty analysts had to contend with was the absence of a legal definition of the composition of milk. The facts he had adduced proved that it would not be difficult at the present time to fix a standard which would protect the consumer without inflicting any hardship or injustice upon the producer.

In answer to the objection that individual cows sometimes gave very poor milk, he maintained that such a state of things was invariably due either to

bad feeding or to debility in the animal. If the former were the case, the remedy was obvious; if the latter, the cow should be condemned for milking purposes. Of the 180 samples he had analysed, and which had been offered for sale in Nottingham, no less than 62 were deficient in fat to the extent of at least 32 per cent., while 73 contained added water; yet in very few cases were the Authorities able to prosecute with the certainty of obtaining a conviction. As things stood at present, even in cases where there was the straightest evidence of adulteration, the milk had still to be passed as pure. Thirty per cent. of fat might be abstracted from 10 per cent., and often 20 per cent. of water added with impunity.

Passing to another aspect of the question, Mr. Trotman said he had recently examined over fifty samples of Nottingham milk under the microscope, and in almost every case there was a deposit of a blackish colour. This was directly due to the presence of cow dung, and every specimen contained hairs, ranging from minute ones, apparently from the cow's udder, to the long capillary appendages of the dairymaid. Other foreign bodies included fungi and fragments of vegetable *débris*. Bacteriological investigations led to equally significant results. The experience of Nottingham milk, he added, was only on a par with that of other large towns. Evidence of a similar nature to that embodied in his paper was coming in from every side, and yet little or nothing was being done in the way of reform. It was his opinion that in a city of the size of Nottingham the sterilisation and distribution of milk ought to be in the hands of the Public Authorities, who would thus become guarantors to consumers of the quality and sanitary condition of the milk supplied. This was already the case in many towns on the Continent, and would not necessitate the raising of the price of milk, while it would abolish the necessity for the delivery twice per day. The whole question was one which should be regarded rather from the welfare of the many than the feelings of the few.

ROYAL INSTITUTE OF PUBLIC HEALTH.

Forthcoming Congress and Exhibition at Dublin.

The annual Congress of the Royal Institute of Public Health will be held in Dublin from 18th to 23rd August, 1898, at the invitation of the Corporation of Dublin. It will be under the patronage of the Lord Lieutenant, the Honorary Presidency of the Lord Mayor, and the Presidency of Sir Charles A. Cameron, Superintendent Medical Officer of Health. The meetings will be held in Trinity College. The section of Preventive Medicine will be presided over by Dr. Grimshaw, C.B., Registrar General; of Chemistry and Climatology, by Dr. John W. Moore; of Engineering and Building Construction, by Sir Thomas N. Deane; and the Parliamentary and Municipal section by the Right Hon. Joseph M. Meade, P.C., LL.D. Conferences of Army Medical Officers, Veterinarians, Medical Officers of Health, and Sanitary Inspectors will respectively be presided over by Brigade Surgeon Lieut.-Colonel Corbett, D.S.O., Chief Veterinary Inspector; Matthew Hedley, Privy Council; Dr. Thomas J. Stafford, Commissioner Local Government Board; and Mr. Conway Scott, Executive Sanitary Officer, Belfast.

Amongst the subjects fixed for discussion are the "Housing of the Very Poor," "Tuberculosis in Animals used as Food," "Enteric Fever in the Army," "The Examination of Candidates for Sanitary Officers," "Combined Drainage." The Army Medical Staff will give a demonstration of "First Aid to the Wounded" in the College Park. There will be demonstrations in bacteriology, calf vaccination; the best method of heating and lighting, &c. The festivities of the Congress will be worthy of the reputation of Dublin as a hospitable city. The Lord Mayor will give a ball, the High Sheriff a luncheon the Corinthian Club a dramatic and musical entertainment, Sir Henry Cochrane and Sir Christopher Nixon garden parties, and other entertainments will it is expected be also offered by leading citizens. The Hospitalities and Excursions Committtee are arranging for excursions during and after the Congress meeting. The celebrated Dublin Horse Show commences on the closing day of the Congress.

Full information of the Congress can be obtained by applying to the Secretaries, Public Health Office, Dublin. In connection with the Congress a Health Exhibition will be held at the Royal University Buildings, from Thursday, August 18th, to Saturday, August 27th, under the auspices of the Institute. It is expected to be on an elaborate scale, and will extend over horse show week, when Dublin will be thronged with visitors from all parts of the kingdom. No important exhibition of a similar character has been held in the city for fourteen years, during which period sanitary science and practice have made immense progress. "The old ways of sanitation," as the Committee point out in their preliminary circular, "have been improved, or have given place to new methods and appliances which inventors and manufacturers desire to make as widely known as possible." They also point out that in every exhibition of the kind a mutual benefit is conferred between the exhibitors and the public, and they earnestly invite exhibitors to put forward only the best possible modern appliances, so as to render the event exceptionally interesting, educational, and successful.

The Board of Trade will be applied to for protection of all novelties exhibited in accordance with the Patents, Designs, and Trades Marks Acts of 1883, and music and other attractions will be provided for the enjoyment of those who will visit the Exhibition. The Committee promise that no effort will be spared to render this the most important and successful Health Exhibition of recent years. The exhibits will be arranged in twelve sections, under the following heads:—Scientific, including such subjects as Physiology, Bacteriology, and Geology, Public Hygiene, Domestic Hygiene, Water Supply, Sewage Treatment and Disposal, Drainage and Plumbing, Heating, Lighting, and Ventilating; Personal Hygiene, including clothing, dress fashions, food, perfumes, and woollens; Electrical Installations and Appliances, Disinfection, Locomotion, including bicycles, tricycles, and motor cars, and Miscellaneous Exhibits, such as ambulances, life-saving appliances, models, and toys.

EFFICIENT DRAIN TRAPS.

By Dr. HERBERT JONES, Medical Officer of Health, Rhondda Urban District Council.

A TRAP may be described as a double bend in the course of a pipe, enabling water to remain in

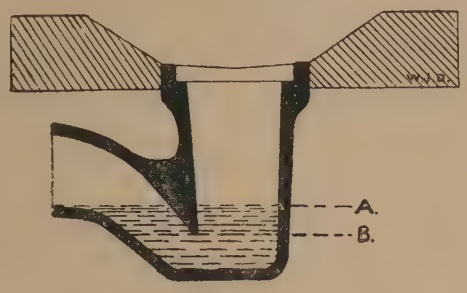


Fig 1.

the pipe in such a position that air cannot under ordinary conditions pass through it.

The bye-laws in force in this district do not prescribe any particular form of trap to be used, they merely require an "efficient" trap. The essentials

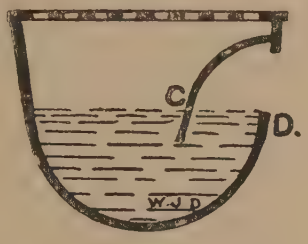


Fig. 2.

of an "efficient" trap are, that it shall be self-cleansing, that it shall have a seal of at least 1½in., and that it shall be fixed in such a manner that the drain cannot be untrapped by removing the trap from its position.

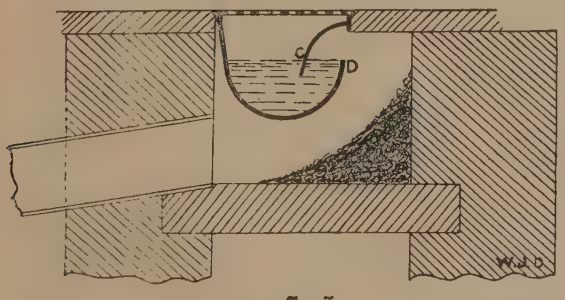


Fig 3.

Fig. 1 shows a trap that very fairly meets these requirements. The "seal" is that portion of the water between A and B. The rounded corners, the material of which the trap is made (earthenware or stoneware), and the flattened bottom, ensuring proper fixing, all add to the self-cleansing properties of this type of trap; though in actual practice it is found desirable to clean it out every week or so.

Fig. 2 shows a form of trap known as the D or lip trap, and the sketch is only given that the trap may be condemned. It has been well described by Sir William Jenner as the double D—"disease and

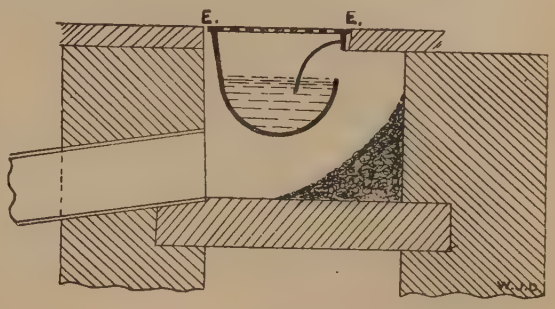


Fig 4.

death dealing"—trap. Being made of iron, the parts C and D very often get chipped off or corroded, whereby the small seal that originally existed is made still smaller, even if it does not altogether disappear. It will be noticed that this so-called trap is not fixed directly on to the first

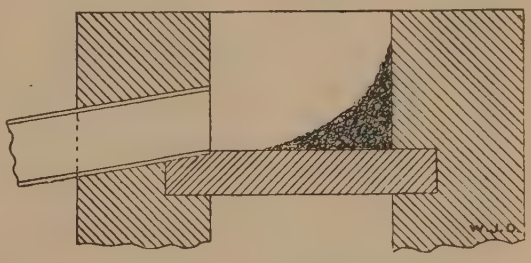


Fig 5.

drain pipe in the same manner as the stoneware gulley, but it is merely placed on the top of a square sump as in Fig. 3, which is lined with bricks more or less imperfectly placed, permitting all kinds of filth to soak into the surrounding ground. But this

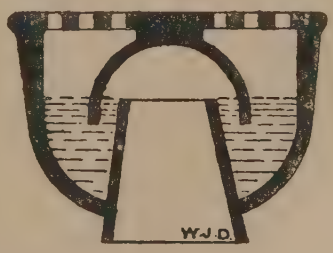


Fig. 6.

is not the worst feature of the D trap (?). Fig. 4 shows the manner in which it is usually placed, all awry, and without any attempt being made to cement it to the stonework or brickwork; for all practical purposes, therefore, there might just as well be no trap at all, for the air from the

sewer can quite easily pass out at the sides of the trap at E E. Again, it is the custom for the householder to take the whole trap away from the drain, as in Fig. 5, in order to pour water down more quickly, indeed where these traps are in use, it is the exception rather than the rule to find one in its proper position, and there is always more or less filthy deposit as shewn in the sketches.

The bell trap shown in Fig. 6 has nearly all the objectionable features of the D trap. It very readily becomes choked, and then the grating is taken off to remove the blockage, when the air from the drain has free access to the external air.

It cannot be too often insisted that a trap is not an all-sufficient safeguard from sewer gas. The water seal may be forced by pressure, or may absorb gases on the drain side and deliver them up on the house side, or the bottom of the trap may be so loaded with filth that the decomposition of this will enable putrefactive gases to force their way through the seal.

THE SMOKE NUISANCE: AN INTOLERABLE STATE OF THINGS.

IT is fortunate for Londoners, remarks the *Lancet*, that the present period of the year happens to be spring, and not winter or late autumn, for the Welsh coal strike appears to have given opportunity to hotel and restaurant proprietors and others to commit a serious breach of hygienic law. The appearance of several of the great thoroughfares of the metropolis has for the last few weeks forcibly suggested the Black Country. Never was London deluged in blacker smoke on all sides than it has been recently. The Strand in particular, that avenue of cafés, restaurants, and hotels, is a disgrace as it is a reproach to the Public Health Authorities concerned. For the last few weeks this thoroughfare has been bathed in murk and gloom, and the atmosphere has been offensive with sulphurous emanations and irritating smuts. The nuisance continues at the time of writing with unabated vigour, and we possess a carefully-kept record of the foul vomiting of several chimneys in the immediate vicinity of the offices of the *Lancet*. It goes on, not for minutes, but for hours, and is not only a nuisance to health, but a source of considerable injury to property.

The effect on buildings decorated with light colouring is disastrous, and the paint everywhere rapidly assumes a deteriorated appearance. All endeavours to keep windows clean are utterly futile. And to open them is only to invite layer upon layer of soot to cover our books, papers, and manuscripts. Even at Westminster they have noticed it, for in answer to a question put by Mr. Labouchere in the House of Commons last week it was stated that the matter was one with which it was the business of the County Council to deal. The plea that the nuisance is caused through the difficulty of getting Welsh or comparatively smokeless coal is idle. The smokiest coal can be burnt without evolving dense or almost solid smoke by the adaptation of a suitable and simple smoke-consuming contrivance above the furnace. It is certain that if the meteorological conditions of winter had prevailed, the smoke would have been locked in by particles of moisture and the worst possible kind of fog would have hung over the metropolis. It is the duty of the London County Council to set in motion the powers vested in them under the Public Health Act, containing as it does a clause which runs as follows: "Any chimney (not being the chimney of a private dwelling-house) sending forth black smoke *in such quantity* [the italics are ours] as to be a nuisance shall be deemed to be a nuisance liable to be dealt with summarily in a manner provided by this Act." Then why are the offenders not "dealt with summarily"?

[We commend to the notice of all who are interested in the important question of smoke prevention, the valuable booklet just published by the Sanitary Publishing Company, Ltd., entitled "Practical Smoke Prevention," written by Mr. W. Nicholson, Smoke Inspector, Sheffield.—ED.]

PROGRESS OF DISINFECTION IN PARIS.

THE Parisian Bureau of Disinfection has made an important report to the Municpal Council upon the results accomplished under the modernised methods employed for the restriction of infectious disease. From this report it appears that in seven years, with a staff which numbers eighty people, the organisation has carried out in Paris more than 171,000 disinfections, the annual average being at present nearly 40,000. In 1886, before the service was organised, there died in Paris nearly 6000 persons, carried off by epidemic diseases. Ten years afterwards, in 1896, the number, which had been gradually falling, fell to below 2000; that is to say, that 3000 or 4000 human lives were saved every year. Without doubt the works which have been carried out of bringing water straight from the springs have contributed greatly to the amelioration of the sanitary condition of Paris, but disinfection has also played a large part.

The total mortality, which was 54,536 in 1892, the date at which the disinfecting service was first organised, fell in 1897 to 46,987, that is to say, an average of 18·54 per 1000 inhabitants in place of 22·47. The principal part of this very considerable diminution in the mortality of Paris is accounted for chiefly by the diminution in zymotic diseases. The mortality from these diseases, which was formerly one-tenth of the whole, fell gradually to one-eighteenth between 1891 and 1895, one-twenty-sixth in 1896, and one-twenty-seventh in 1897. Enteric fever in 1892 accounted for 691 deaths and in 1897 for 231. In 1892 there were 42 deaths from small-pox, and only 12 in 1897. In 1892 there were 909 cases of measles, and only 811 in 1897. The deaths from scarlet fever, which were 158 in 1892, fell to 76 in 1897. There were 334 cases of whooping-cough in 1892, and only 282 in 1897.

Finally, diphtheria, which gave rise to 1403 deaths in 1892, was the cause of only 306 in 1897. M. Landrin observed that tuberculosis remained stationary because prophylaxis against this terrible disease, which is accountable for one-quarter of the whole mortality, is not yet a definite part of the social system. He reminded his audience that both the Municipal Council and the Government are ready to make a great effort to fight against tuberculosis. In addition to the measures taken in hospitals, and the system of treating the poor at their homes, as well as those unfortunates who are under the care of the Assistance Publique, measures

were taken during 1897 by the municipal disinfection organisation with the view of carrying out a more complete and methodical campaign against tuberculosis. The report concludes with the recommendation that measles, which is to-day one of the most fatal zymotics, should be made a compulsorily notifiable disease.

INOPERATIVE SANITARY LEGISLATION.

ON Tuesday week a conference, convened by Canon Barnett, the warden, was held at Toynbee Hall, Whitechapel, for the purpose of considering the inoperativeness of various sanitary laws. Sir Arthur Arnold, London County Council, occupied the chair, and there was a good attendance, many local sanitary officials from the East End districts being present. The discussion was opened by the CHAIRMAN, who complained of the insanitary condition of many rural districts. With some of these the slums of the East End would bear no comparison. He believed that if the benefits arising from cleanliness could be demonstrated to the masses their condition would improve rapidly.

Dr. SCHOFIELD then read an interesting paper, in the course of which he contended that London owed its singularly low death-rate to operative health laws, and rural districts were at least fifty years behind the metropolis in regard to sanitation. Having referred to the filthy condition of Oriental cities and its consequences, Dr. Schofield expressed the firm opinion that health laws were operative in this country to a greater extent than in any other country in Europe or Asia. But still much required to be done, for there were three barriers which could be raised against death, viz., the public, the professional, and the private barrier. It was to the last of these three that he had devoted so many years of his life, and had been trying to teach the women of England how important it was that they should be cleanly in their work and habits. He had given more attention to the cleanliness among women because the health of the population depended so largely upon them. Miss Florence Nightingale had made the startling statement in "Village Life in England" that the average woman seldom washed, and he had inaugurated an organisation of nurses to visit the cottage homes of England to point out the sanitary defects of their dwellings and the benefits of personal cleanliness. Sanitary officers said it was impossible to carry out sanitation and sanitary laws in the country as was done in London, but he believed that the laws would have to be gradually carried out until their observance became general. When it was considered how the people were crowded together in London, on a flat, marshy soil, with drinking water, one half of which was used for sewerage purposes, the sanitary arrangements of London were marvellous. At the same time they were not perfect, and to bring about an ideal state of things they had to consider the causes which made sanitary laws inoperative. One cause was ignorance, for the sanitary laws were too new to be thoroughly understood even by Sanitary Inspectors or magistrates. Apathy and indifference were other causes, and the immense difficulty of enforcing the sanitary Acts was another cause of their inoperativeness. Overcrowding, despite the efforts of the Sanitary Inspectors, was still practised to a great extent, but fines and imprisonment would not stop this evil, because working men could not afford sufficient accommodation. Ignorance on the part of Vestrymen also accounted for a great deal of the delay in dealing with bad conditions. Although there had of late been an improvement, bad Sanitary Inspectors were still to be found. Obstruction on the part of the landlord was also responsible for ineffectiveness of the sanitary laws passed by Parliament. Discussing the remedies, Dr. Schofield suggested that the standard of efficiency of Sanitary Inspectors should be raised, and to increase the knowledge of the health laws among the people.

In the course of the discussion which followed, most of the speeches turned upon overcrowding in East London, and severe criticism was passed upon Mr. Woonton, the Chief Sanitary Inspector of St. George's-in-the-East, who in an interview published in the *East London Observer* had stated there was no overcrowding among the foreign population of his district. Votes of thanks to Dr. Schofield and the chairman concluded the proceedings.

THE VALUE OF A DIPLOMA IN PUBLIC HEALTH.

NOT a few of those many medical men who within recent years have obtained diplomas in public health from one or another of the qualifying bodies will fail, we much fear, says the *Lancet*, to reap a due pecuniary reward for all their labours. We use the term pecuniary reward advisedly, since nothing can take from the possessors of these diplomas the enhanced interest in matters sanitary and social which the knowledge they have thus acquired confers upon them. The disappointment to which reference is made will arise in the main from paucity of appointments and from poverty of pay; but in spite of this it will come as a surprise to many to hear that in some appointments the possessors of experience and of diplomas will be sent away while the owners of neither will be elected. Such, however, has recently been the case in Essex, when, on the creation of a new urban sanitary district out of part of a rural sanitary district, the necessity to appoint a Medical Officer of Health arose. Here there were, we are informed, three applicants: one, the holder of an M.D. degree, who was the Medical Officer of Health of the rural district out of which the new district has been created, and whose name is well known among East Anglian sanitarians; another, besides being a graduate in medicine and surgery, held two diplomas in public health. The third, the selected candidate, was, it appears, untutored either in the school of experience or of special diplomas, and held but the Licentiate of the Society of Apothecaries. What can we say as to this newly-created urban sanitary body but that it, too, presumably possesses neither experience nor diploma? We are afraid that this view of the situation does not excuse the action of its members, because the want of experience from which they suffer should surely have induced them to obtain an experienced officer to guide their faltering footsteps. Fortunately, the Local Government Act of 1888 has done much to prevent abuses of the kind to which reference is here made and renders it very improbable that a

district with a population of some 50,000 will be saddled with a Medical Officer of Health who has had no special training for the post.

COMBINED *v.* SEPARATE SYSTEMS OF SEWERAGE.

THE problem of sewerage and drainage is one which sooner or later every community in the present age of growth and development will have to grapple with. While the water supply is derived from wells, rain-water cisterns, and streams, there is not the demand for any elaborate system of sewerage, because of the ready facilities for disposal of waste matters in cesspools, privy vaults, street gutters, and watercourses. As soon, however, as a regular and abundant water supply is secured, it becomes a matter of necessity to provide proper facilities for the removal of house wastes, which naturally increase in volume with the increased water supply. That is the problem which is made the subject of a recent communication, in which as much light as possible is asked as to the comparative advantages of the combined and separate systems of sewerage, the size of pipes, &c., and a variety of questions an intelligent answer to which calls for a considerable amount of information on a subject not yet satisfactorily settled. We give a few general pointers on the subject, however, which may be of more or less utility to inquiring readers.

The advocates of the combined system of sewerage have at least one very strong argument to use in its favour; it has age to recommend it, dating back from the days of the Romans. But it is claimed that in the light of modern experience it is far from desirable to have a sewer constructed so much in excess of what is ordinarily needed as to provide for contingencies in the way of sudden severe rainstorms which may occur only at distant intervals. The old-fashioned notion of having at all times a sewer or tunnel of brick, 4ft. or 5ft. in diameter, is fast giving way to views based on sound reasoning that it is not at all desirable to construct, at greatly increased expense, a system of sewers which may never, even under the most unprecedented circumstances, be filled to their utmost capacity. It is also claimed that the size of sewers on the combined system presents inducements for disposing of every sort of otherwise indisposable rubbish which could not be put in a smaller sewer—and the further drawback that it is an impossibility, except at rare intervals, to properly flush a large sewer.

The advocates of the separate system maintain that it is essentially necessary to the health of a community that the means of removal of house wastes should be entirely independent of the conduits provided for carrying off storm water, and that such channels should be of such size only as would preclude the possibility of the sewage being stored, as it were, therein in dry weather, without the necessary volume of water to carry it away. But there is more care involved in the proper laying of the pipes, and in the selection of the size and material than may appear at first sight. As regards the material, good salt-glazed earthen pipe should be used, and in the selection of size a governing condition, might be the bore of the water main, because it is tolerably fair to presume that if a given diameter of pipe supplies all the water needed, the same diameter should be sufficient to carry off all of the water which is used in the ordinary purposes of life. It does not happen that all the water supplied is invariably used up as fast as received. On certain days of the week perhaps it does, but it is a fair enough guide to know that if a 5in. main supplies all the water needed, a 5in. sewer should be sufficient for the necessary drainage.

Two other matters should not be lost sight of, viz., automatic flushing and ventilation, both of which are absolutely necessary. At the head or highest level of the main and each of the branch sewers, there should be set an automatic flush tank capable of discharging every six hours or thereabouts a sufficient volume of water to fully fill the bore of the sewer for a distance of about 3ft. or 4ft., so as to completely cleanse and remove everything in it. This column of water in its passage will naturally displace the air in the pipe and drive it before it until some means of escape offers itself, and the method of escape (or ventilation) will require some care and judgment. The commonly-accepted method is the perforated manhole in the street, while those who are opposed to the trap on the main house drain inside the front wall of building consider that if the trap were removed the soil and waste-pipe system would be an excellent medium for ventilating the sewers, as by the ever-changing currents throughout the pipes there would be no opportunity for the generation of dangerous gases. All this, however, presupposes a perfect system of house plumbing, a thing not always general in these days, and the consequence would be, it is claimed, that there would be no protection in the event of contagious disease breaking out in any particular house where sewer communication would have been established.

It is not supposed that this expression of view has in any way disposed of the question as to which of the two systems of sewerage is the more desirable. This is a point which would involve considerably more detail than the writer has time or opportunity to devote to it. Besides, it is a question which has yet to be decided by the sanitarians of the country, and we do not propose to anticipate their action. The separate system, however, seems to us to have the advantage over the combined, in so far that the smaller sewer pipe used is less liable to the generation of foul gases, because of its being more thoroughly cleansed—and there being less liability to obstruction, there is not the same danger to be apprehended from stagnant matter remaining in the pipe. There is also the item of expenditure in construction, which is in favour of the separate system, the outlay being brought down to the minimum of requirements. The combined system means an expense greater than is at all needed in constructing sewers needlessly large to provide for contingencies which may never occur, while the separate system involves nothing beyond the construction of sewers sufficient to carry to a safe distance the house water and sewage of the community.

NOTICE.—The Annual Subscription to this Journal has been raised to 12s. 6d. to all NEW Subscribers. NO ADVANCE will be made to our friends whose names were entered on our Subcription list prior to March 31st, so long as they continue to Subscribe.

SANITARY WATER ANALYSES.*

By FLOYD DAVIS.

THE impurities that affect the quality of water for domestic purposes are inorganic and decomposing vegetable and animal matter, and the micro-organisms of disease. Some of these exist in harmful quantities in the water of many streams, and in other sources that flow through or originate in rich agricultural or swampy land and densely-populated districts. A small amount of fine, non-silicious mud or silt in drinking water is not known to produce disease, and is objectionable only from an æsthetic standpoint. But the large amount of angular particles of sand and decaying vegetation found in some streams is frequently productive of intestinal disturbances, like inflammation of the bowels, diarrhœa, and dysentery; and any water that is distinctly turbid should be regarded as non-potable, until it has been clarified and freed of its organic matter.

At certain seasons some algæ produce a disagreeable taste and odour that make it unpleasant to drink water containing them, while nearly all decaying vegetable matter favours the production of intermittent and malarial fevers. Malaria was once thought to be only of aërial origin, but the foremost investigators now attribute it also to stagnant water, containing an abundance of decaying vegetable matter.

As people gain knowledge in sanitary science, many of these impure waters are abandoned in favour of deep wells, or they are mechanically purified, generally with the happiest results in reducing the number of fever cases, or in the entire eradication of the disease. While impure water is thus productive of malaria, the fever is not directly attributable to organic matter; it is produced by a protozoon, the *plasmodium malariæ of Laveran*, which is supposed to exist in and about impure surface waters, although the organism is rarely found outside the human body. Insects that inhabit swamps and stagnant ponds may also be instrumental in propagating this fever, since the common mosquito is now regarded as the host of the malarial germ, sometimes transferring it to persons susceptible to the disease.

Far more important and dangerous, however, than mineral and vegetable matter is animal refuse, such as sewage and drainage from cesspools and privies. This not only furnishes a favourable pabulum for the growth and development of micro-organisms; but also opens an avenue to the system for admission of infection; and drinking water contaminated with sewage is intimately connected with disease, as well as objectionable from an æsthetic standpoint. There is a vast difference, however, between the infectious nature of sewage in its fresh condition and that of sewage which has undergone complete chemical change. So long as it remains as sewage, *i.e.*, retains its original nitrogenous ingredients not completely converted into new compounds, it is liable to be disease producing. Among the numerous bacteria of its earlier existence there are probably some that are harmful, and the sewage environment may so modify others as to render them pathogenic. But through the effects of dilution, precipitation, oxidation, and nitrification, these ingredients gradually disappear from contaminated water; still, we cannot rely on the disappearance of the most harmful agents at any given time, or under any given condition, for it is now well known that the self-purification of water, so far as bacteria are concerned, is much less than was once supposed.

Still, under nature's agencies, polluted water may be so improved that the factor of danger becomes inappreciably small, and it may then be drunk with the same assurance of safety that prevails when we eat or breathe. Hence it will be seen that pure and impure, like normal and abnormal, waters are distinguished only by the amount of certain constituents common to all, and it is true that nearly all natural waters have some foreign substances which would condemn them, were they present in sufficient quantity. From the nature and effect of this extraneous matter, it is evident that a drinking-water should be considered pure only when practically free from decomposing vegetation, and absolutely free from fresh products of the human body. So sanitarians have learned that it is not so much the quantity as the quality of the impurities in water that determines its suitability for drinking, and the foremost investigators uniformly condemn all waters that are in the least contaminated with fresh sewage. Even after sewage has been changed by oxidation to its final products, there may be danger from the use of water containing it, on account of its germs. This is especially true with surface waters originating in a gravel and limestone soil, for the organic matter is changed to nitrates more rapidly than the bacteria are removed. And, as typhoid fever and cholera are well known to be produced by infectious bacteria which accompany sewage, it is important, in interpreting every sanitary water analysis, to keep in mind the changes through which sewage passes under the action of the constituents of the soil.

A water is pure and wholesome when it meets all the requirements of the body in absorption and elimination, even in the most delicate constitutions. But some waters have unpleasant taste from mineral and decaying organic constituents; some have unsightly appearance from colour or suspended matter; some have disagreeable or disgusting odour; while others are so charged with inorganic salts that the kidneys are overworked in eliminating the waste products of the body. All these objectionable waters should be regarded as impure, and they are certainly unwholesome, because the system rebels against anything which is not approved by the senses of sight, taste, and smell. Such water is sometimes forced upon a community until public necessity compels it to be abandoned in favour of a pure and wholesome supply. We are safe in going still further, for, when a water is even liable to become contaminated with sewage, it should be guarded against with the same care that is exercised in dealing with the most dangerous poisons.

The diseases that are known to be produced by impure water are Asiatic cholera, typhoid fever, malaria, diarrhœa, dysentery, and some other intestinal disorders. These diseases are either the result of an irritant, or are produced by bacteria or other micro-organisms, and it seems at first thought that an investigation to determine the wholesomeness and suitability of water for domestic use should consist in searching for the immediate agents of disease. But experience shows that the bacteria

* *Engineering Magazine.*

in water are so numerous, and so resemble one another, that the harmful micro-organisms, even in the most contaminated waters, are but a small proportion of those that are present. Their determination requires the most careful study and patience, and much time, and the results are generally negative and unsatisfactory. So, in ascertaining the sanitary quality of a water, it is safer, as well as easier, to determine the organic impurities, like sewage, than the bacteria, for the pathogenic micro-organisms exist only in natural water that has, or once had, measurable quantities of organic matter. The amount of water required for a chemical and microscopical analysis is so large that any foreign matter which might exist in the general supply would, in all probability, also exist in the sample operated on; and the determination of sewage shows the possibility of accompanying dangerous micro-organisms. In sanitary water investigations it is not customary, therefore, to search for pathogenic germs, but to determine irritating substances and other associations and conditions that favour disease. This is done principally by chemical and microscopical analyses, and, in the testing of filters, by additional bacteriological examinations of the water. But a thorough investigation of a public water supply should always involve a sanitary survey of the surrounding country to determine the contaminating agencies. Sometimes also study of statistics will show a relation between death-rate and quality of water supply; and in all this work much depends upon proper interpretation of the results.

THE SANITARY SURVEY.

A sanitary survey will sometimes reveal enough pollution to condemn a water, no matter how small the amount of organic matter and how low the number of bacteria found in it. Whenever there are visible sources of filth, the water should not be used for drinking in its natural condition, especially when any of the pollution is sewage. Every season brings to our attention many cases of disease attributable to impure water, where the contamination is visible and might have been removed; and so the opinion grows stronger, year after year, that, by applying an ounce of prevention to the discovery and removal of pollution, pounds of cure would never be needed. It is always necessary to know the origin of a water that shows but little organic matter, before giving even a conditional final opinion of its quality for drinking, and the results should be compared with local standards of permissible impurity. The free ammonia sometimes found in deep wells would condemn a surface water without further study, and yet in the deep-seated water it is permissible; and the chlorine and nitrates of some mineral waters greatly exceed the permissible limits of those found at the surface. Many polluted waters found in limestone soil are free from organic matter, because this has been oxidised to harmless products; and, if we rely entirely upon our reagents and microscopes, without regard to chemical change or source, we generally pass too favourably upon the water.

In forming an opinion from the sanitary survey, it is always safe to condemn a water which shows visible contamination beyond a reasonable limit of æsthetic permissibility; yet, when laboratory methods fail to find organic matter, or its associations, in water, we are not warranted in pronouncing it good, unless we know that these have never existed in it. The most that can be said in favour of the water is purely negative. On the other hand, it is often proper to condemn surface waters, even by the sanitary survey alone; but it is unwise for a chemist to rely very much upon the investigations made by inexperienced men. The most competent investigators give an opinion only after an examination of the source of supply and the whole drainage area, made by themselves or by others equally skilled.

MILK CONTAMINATORS AND SCARLET FEVER.

Dr. Matthew Hay, Medical Officer of Health, Aberdeen, in his monthly report on the health of the city, makes lengthened reference to the prevailing epidemic of scarlet fever. The 49 cases in the present epidemic obtained, so far as can be ascertained, at least a portion of their milk supply directly or indirectly, but mainly indirectly, through the medium of one or other of five milkshops in town from a certain farmer in the country. With one milkshop there are associated 20 cases; with another, 12 cases; with a third, 9; with a fourth, 4; with a fifth, 1; and with the farmer himself, 3—the farmer supplying the bulk of his milk to milk shops and retailing only a little to private customers. The great majority of the cases occurred within a few days of each other; for example, 3 were taken ill on April 7th, 2 on the 8th, 7 on the 9th, 12 on the 10th, 5 on the 11th, 3 on the 12th, 5 on the 13th, 14th, or 15th. Some of the latter cases have probably been infected not directly by the milk but by contact with cases so infected. When allowance is made for a varying period of incubation in the cases, it would appear as if perhaps half of the cases, or more, had been infected from a single day's infection about the 5th or 6th of April.

The simultaneous outburst of scarlet fever among the customers of more than one dairy was against the milk being simultaneously but separately infected in the various milkshops in town. Such a coincidence of infections is in the highest degree improbable, although to make sure, the persons and families associated with the carrying on of the milkshops were examined, but nothing was found. The conditions clearly pointed to the infection of home milk supply common to all the milkshops. On investigation it was found that one farmer did supply all the suspected dairies with the whole or a portion of their milk, and that all the milk thus supplied came from his own cows and was brought into town daily in his own cart, and it was further found that the milkshops in connection with which the outbreaks arose were the only milkshops supplied by this farmer. The farm was visited as soon as there was sufficient ground for suspecting it, and with the assistance of the county Health Officers, which was most fully and ungrudgingly given, a careful examination was made of the persons employed or living on the farm premises, and a simultaneous inspection of the cows was made by the county Veterinary Inspector. No history of illness could be elicited from any servant or member of the family, and beyond some slight symptoms of sore throat and the like, which were

consistent with a recent very mild attack of scarlet fever, but not conclusive of it, nothing definite was discovered. The cattle were pronounced by the veterinary surgeon to be in good health, and he specially examined the udders and teats for traces of disease, in view of the fact that on one or two occasions it has been asserted—in my opinion, on insufficient grounds—that a milk outbreak was due to infection from cows. There remained the possibility that the milk had been infected in transit to the town, but as the milk was in cans or other closed vessels, and as the farmer himself alone travelled with the milk cart, this mode of infection seems unlikely. There is no doubt in my own mind, from a full consideration of all the facts, that in spite of the practically negative result of the inspection of the farm, this farmer's milk was the source of the epidemic. The probability is that we had to deal with the occurrence in the farm household of one of those exceedingly mild attacks of scarlet fever which happen so often now-a-days, and which frequently go quite unnoticed. Nothing more may be observed than a slight sore throat for two or three days, with slight unwellness, and if it occurs in a child the parents may not have noticed it, and the child, when questioned about it a few days later, is found to have forgotten about it. In certain of these cases even desquamation, which comes on in the later stages of the disease to aid the diagnosis, may be wanting, or so slight as to have escaped observation. I attach no blame to the farmer in this outbreak. The outbreak, however, enforces the need of very careful attention to the state of health of persons in or about dairies. Sore throats should always be regarded with the greatest suspicion—they may be symptomatic of scarlet fever or diphtheria—and, if at all practicable, persons so suffering, or persons who feel fevered, should not be permitted to milk cows or to handle or go near the milk. Young children, who are so susceptible to infectious diseases, and who are so often suffering from one or other of infectious diseases, should never be allowed to take part in a dairy in handling or washing milk vessels or in carrying milk, and should, indeed, be kept strictly outside the milk-house. Fortunately, all the cases of fever in the present outbreak have been mild, and in some instances as mild as the case from which the infection may have sprung. This, perhaps, may be held to support the theory of infection from an unnoticed mild case. It has reproduced its own type. A curious point in the outbreak is the age of the persons attacked. In the vast majority of ordinary cases of scarlet fever the age of the patient is under 14 years, and is usually about five to ten. In the 49 cases of the outbreak, only 17 were under 14 and of the remaining 32 a large number were over 20 years. It is also worthy of note that of the 32 patients above 14, 21 were males and 11 females. As most of the cases were removed to the city hospital, the quite exceptional proportion of grown-up patients there has been most noticeable, especially in the male wards. There remains only to be added that the farmer, as soon as the facts of the outbreak were brought to his notice, agreed to suspend his milk supply for two days until arrangements were made for procuring a perfectly fresh staff from the outside to carry on the dairy work of his farm.

Sanitary Inspectors' Associations.

SCOTLAND.

THE annual meeting of the North-Eastern Branch of the Sanitary Inspectors' Association of Scotland was held in Aberdeen on Saturday, the 21st inst. Mr. Anderson, C.E., Sanitary Inspector, Forfarshire, chairman of the branch, presided. There was a fair attendance. The secretary's report of the year's work was laid before the meeting, and was considered satisfactory. The following members were elected as office bearers for the ensuing year:—Chairman, Mr. Anderson, Forfarshire; vice-chairman, Mr. Cumming, Carnoustie; secretary and treasurer, Mr. Forbes, Aberdeen; other members of Committee, Messrs. Mackintosh, Banffshire; Graham, Kincardine; Milne, Elgin County; and Turriff, burgh of Elgin. Mr. Cumming, Carnoustie, read an interesting paper on water supply. He dealt with the various sources of supply—from rain, springs, wells, rivers, and upland surface water—with the qualities and causes of pollution of these different classes of supply, and the methods of purification and the qualities supplied to different towns. After a discussion, on the motion of Mr. Cameron, president of the Sanitary Inspectors' Association, seconded by Mr. Mackintosh, Banffshire, and supported by Mr. Anderson, chairman of the branch, a hearty vote of thanks was accorded to Mr. Cumming. A proposal by Mr. Anderson that the branch should visit some place of interest in the autumn was then considered, after which the meeting terminated.

THE MEDICAL AND SURGICAL EXHIBITION.

THIS exhibition was opened on Tuesday in the Queen's Hall, Langham-place. The object aimed at by the promoters is to bring before the profession and its auxiliaries the most recent results of scientific research in the mitigation of pain and fighting the ravages of disease. There was a formal opening by the president—Mr. F. Weiss—who emphasised the fact that last year's show was visited by 4260 of those for whom it is intended. One of his own inventions for cauterisation by burning ether is one of the newest discoveries in surgical art. Through a warmed and regulated tube framed like a pencil case the cauterising agent is applied with effect for the removal of tumour. Several of the stalls are bright with highly-polished instruments. Others are stocked with medicated foods, notably breadstuffs prepared to counteract exhaustion from diabetes.

Malt extracts, which are now very much in vogue, gives as the latest invention a kind of stout made from malt only by Mr. Hoff, claiming to be a powerful tonic containing only 2½ per cent. of alcohol. It is certainly pleasant and refreshing. Sterilised and humanised milk figures largely, and so too do the various essences of beef. Extracts of the essential properties of vegetables are likewise in evidence, and a wide variety of lozenges, tabloids, tonic wines, and miscellaneous preparations, which are at all events freely submitted to the test of qualified judgment.

General News.

LEEDS.—The erection of Turkish baths by the Corporation is under discussion.

BANBURY.—The Town Council has decided upon extensive improvements of the public baths.

ST. MAWES.—A conference has been arranged by the Truro Rural District Council with reference to the practicability of getting a water supply.

PENZANCE.—At a recent Town Council meeting Mr. Mansergh's report on the water supply of the town was read. It recommended a scheme estimated to cost £74,000.

UTTOXETER.—The Urban District Council has called in Mr. J. E. Willcox, C.E., of Birmingham, to advise and report on a scheme for augmenting the supply of water to the town.

HASTINGS.—The quarterly report of Dr. A. Scarlyn Wilson, Medical Officer of Health, gives, after deducting the deaths of strangers in public institutions, a total number of 333 deaths in the borough, giving a death-rate for the period mentioned of 18·56 per 1000.

PRESTON.—Dr. Pilkington, Medical Officer of Health for Preston, has issued his annual report. Out of every 1000 children born in Preston during 1897, 263 died before attaining the age of twelve months. In none of the other thirty-three large towns was this enormous death-rate exhibited.

NOTTINGHAM.—The Health Committee of the Corporation has visited Leyton for the purpose of inspecting the "destructors" at work there. Upon its experiences here as well as at Sheffield and Bradford the Committee will prepare a report to the Council, and make certain recommendations.

BIRMINGHAM.—A meeting of the Finance Sub-Committee was held recently at the Council House, under the presidency of Councillor Johnstone. The hon. treasurer reported that the expenses of the Congress were estimated to amount to at least £1500. Contributions to the guarantee fund had only been received from 302 persons, and it was decided that a further appeal should be made for additional guarantees.

ABERDEEN.—The City Hospital Committee of the Town Council has had under consideration the proposed extension of the administrative block at the hospital. Mr. Rust, City Architect, submitted amended plans showing accommodation for nurses and servants on the main block, and also showing the extension of the north wing of the present reception block. The total cost of the extensions is estimated at £4650. The Committee generally approved of the plans.

ST. SAVIOUR'S, SOUTHWARK.—"Ice cream" as sold by itinerants in the streets has been considered by the Sewers and Sanitary Committee. After thoroughly investigating the matter, the Committee report that it is extremely difficult to proceed against vendors of deleterious ice cream under the existing Food and Drugs Act. A letter is to be sent to the Home Secretary calling attention to the fact that ice cream is largely sold in the streets of London to children, and urging upon him the desirability of the Act being amended so as to include the sale thereof.

LEEDS.—The Insanitary Areas Sub-Committee of the Leeds Corporation is making progress with the work necessary for the removal of the insanitary area at Camp Field, Holbeck. Nearly all the property which it is proposed to demolish has been bought, and the Sub-Committee has accepted tenders for the erection of ten dwelling-houses in Derwent-avenue, near Bath-road, Holbeck, at a cost of £1815. These houses are intended for the accommodation of persons who will be displaced by the carrying out of the scheme, the Local Government Board requiring that provision should be made for them by the Corporation.

LOWESTOFT.—The new children's wing at Lowestoft Hospital has been opened. It has been designed in character with the existing building, and is connected therewith by a covered way paved with tiles. The large ward is arranged for six cots. The floor is laid with polished maple blocks, and the walls finished with Parian cement. The ward is heated by means of Shorland's central ventilating stove, and is lighted by incandescent burners. There is also a smaller ward for two beds, with a separate entrance, so that, if occasion requires, it may be used as an isolation ward. There are separate lavatories and bath-rooms to the wards, and between them is a nurses' duty-room.

WOODFORD.—It is proposed to erect a cottage hospital at Woodford. The site selected occupies a corner position in Broomhill-walk, facing the Green. The plans provide on the ground floor a male and a female ward with a nurse's room between. Each ward will contain three beds, but the accommodation is sufficient for six beds each. In the female ward will be placed the children's cots. Opposite to the operating-room is the matron's bed-room and sitting-room. The kitchen and domestic offices are placed at the rear. Beneath the kitchen are the coals and wood store, together with a heating chamber. The first floor provides for one male and one female paying patient, servants' bedroom (two beds), nurses' bedroom, bath-room, &c., and store-rooms. It is proposed to carry out the elevations in red brick with stone dressings, and roofed with Broseley tiles.

Personal.

MR. A. BLACKMAN has been appointed Electrical Engineer under the Poplar District Board.

MR. P. COLEMAN has been appointed Medical Officer for the eighth district of Tendring union.

MR. WALTER RIDLER has been appointed Inspector of Nuisances for the borough of Tewkesbury.

MR. A. CHAWNER has been appointed Medical Officer for the Clay-lane district of Chesterfield union.

MR. ANTHONY J. METCALFE has been appointed Inspector of Nuisances for the urban district of Masham.

THE Local Government Board has sanctioned the appointment of Mr. G. D. Risdon as Medical Officer for No. 2 district of the Wells union, at a salary of £90 per annum.

MR. R. W. REED has been appointed Surveyor and Sanitary Inspector for the borough of Lostwithiel.

MR. J. BOLTON, of Heywood, has been appointed sewage works manager under the Heywood Corporation.

MR. ARTHUR BOULTON has been appointed Medical Officer of Health for the urban district of Woodhall Spa.

THE salary of Dr. Hamer, Assistant Medical Officer to the London County Council, has been raised from £600 to £700 per annum.

MR. THOMPSON has been appointed Inspector of Nuisances for the urban district of Lye and Wollescote, at a salary of £40 per annum.

DR. BRABYN has been appointed Medical Officer of the south-western district of Wimbledon, and Dr. Hemingway of the south-eastern district.

DR. H. HEMSTED has been reappointed Medical Officer of Health for the Whitchurch Board of Guardians, at a salary of £66 10s. per annum.

MR. W. W. BRUCE, L.C.C. for Bow and Bromley, has been elected a Lee Valley Drainage Commissioner in the place of Mr. Arthur Humphrey.

DR. C. V. DINGLE has been appointed Medical Officer for the Corporation of Middlesbrough, in room of the late Dr. Malcomson, at a salary of £350 per annum.

MR. ARTHUR B. HOWE, M.R.C.S., and L.R.C.P., has been appointed Medical Officer for the district of Claygate (Kingston union) in succession to Dr. Maclaran, resigned.

MR. ROBERT HILL has been appointed Nuisance and Water Inspector for the urban district of Chesham, at a salary of £75 per annum, in room of Mr. F. Dawkins, resigned.

THE Local Government Board has sanctioned the appointment of Dr. A. H. Ransome as Medical Officer of Health for the urban district of Southgate, at a salary of £75 per annum.

THE Local Government Board has sanctioned the reappointment of Dr. Evers as Medical Officer of Health for the urban port district of Faversham, at an increased salary of £10 per annum, also the reappointment of Dr. Evers as Port Medical Officer, and Mr. W. Evernden as Port Sanitary Inspector.

THE following announcement will be of interest to a large number of our readers :—We are informed that a marriage has been arranged between Miss Jane S. Wilson, eldest daughter of Mr. John Wilson, M.P. for the Govan division of Lanarkshire, and Dr. W. J. Collins, D.L., J.P., late Chairman of the London County Council.

Sewerage Schemes.

[TO MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

THE Local Government Board has refused its sanction to the borrowing of £4500 for the Little Common drainage scheme, Oldbury.

THE Plympton Rural District Council has decided to apply for a loan of £3500 for the joint scheme of drainage for Egg Buckland and Compton.

THE Barton Rural District Council has received the sanction of the Local Government Board to the loan of £1130 for the Flixton sewage disposal works.

THE Rowley Regis District Council has decided to borrow £4000 from the Birmingham branch of the Bank of England, being part of the sum of £25,000 to be borrowed by the Council for sewerage purposes.

AT a recent special meeting of the Royton Urban District Council it was decided to borrow an additional £22,416 for sewerage purposes. The special permission of the Local Government Board has been obtained for the loan.

THE Town Council of Brighouse has decided to accept the tender of Messrs. Hughes and Lancaster for the supply of machinery at the sewage outfall works, the cost to be £1569. The total amount spent on the sewage scheme is reported to be £59,575 9s.

THE Wakefield Rural District Council has decided to fence the boundary of the sewage works at an estimated cost of £95, and to ask the Local Government Board for the inclusion of this sum in the estimate for £4000 in lieu of the sum therein included in respect of subsoil drains.

A SPECIAL meeting of the Mansfield Woodhouse Urban District Council was held recently, under the presidency of Mr. W. W. Hall, to receive and consider a report from the engineers, Messrs. Hodson and Son, Loughborough, setting forth a scheme to deal with the sewage of the village. A letter addressed to the chairman from the engineers was read. A tracing of the land which could be adapted for the purification of the sewage was enclosed. The communication asked Mr. Hall upon what terms he would lease the land to the Council for sewage disposal purposes for a period of not less than thirty years, the terms to include the right to lay the main sewer across the land. Bearing in mind Mr. Hall's objection to the treatment by broad irrigation, they had not renewed the original proposal to take the land around the bailiff's house. Ten acres of land would be required, upon which deposit tanks would be built for the purpose of arresting the solids, and the treatment of the sewage would be through bi-bacterial filters. As an alternative scheme Messrs. Hodson asked Mr. Hall if he would lease the Council a field of 2557 acres in extent, to be utilised in connection with a scheme comprising the erection of pumping plant, &c. The sewage, after being pumped, would be treated on the broad irrigation principle, over two fields of 15½ acres belonging to the Duke of Portland, if they could lease the land from his Grace. A resolution was adopted instructing the Clerk to write to the engineers for information as to the cost of adopting either scheme.

THE Carlisle City Council has instructed the Surveyor to prepare plans, &c., of a bacteriological filter to deal with a portion of the town's sewage on the Dibdin principle.

THE Loughborough Town Council has resolved that application be made to the Local Government Board for a loan not exceeding £2500, to meet the costs of sewerage works.

AT a recent meeting of the Heath Town District Council the sewerage engineer, Mr. R. E. W. Berrington, reported that the work of the sewerage scheme was proceeding satisfactorily. The question of water carriage versus pail system of domestic sewerage would shortly be considered.

THE Medical Officer of Health for Chipping Sodbury, in his annual report, states that the sewage works at Wickwar were so far completed that the whole of the sewage from the land and the two breweries was, in the early part of the spring, cut off from the old inlets to the brook, in which it has for so many years created such a nuisance. The experience which has been acquired since then has shown that the resources provided for dealing with the sewage at the outfall are not sufficient to give a satisfactory result, and that without an enlargement of them the nuisance will only be shifted from the brook to the land on which the sewage is allowed to flow.

Lighting.

THE Kidderminster Town Council has decided that the town be lighted with electricity.

THE Johnstone Corporation has decided to proceed with important extensions to its gasworks.

THE estimate for the proposed improvements and extensions at the Burnley Borough Gasworks is £6510.

THE General Purposes Committee of the Birmingham City Council has decided to recommend the purchase by the Corporation of the business of the Birmingham Electric Supply Company, the suggested terms being the present market price of the £5 share, viz., £10 10s.

TO cope with the enormous increase in the consumption of gas in the district of Leigh, caused by the rapid increase in the population, the Urban District Council has decided to apply to the Local Government Board for sanction to borrow £25,000 for gasworks extensions, and £10,500 for proposed electricity works.

THE profits of the gas department of the Lancaster Town Council for the past year are reported to be £1080.

MR. A. BLACKMAN, of Aberdeen, has been appointed resident electrical engineer to the Poplar District Board of Works, which is about to effect an electric lighting installation.

MR. WRIGHT, the electrical engineer to the Brighton Corporation, has been engaged by the Whitechapel District Board of Works to advise as to an electric lighting installation for that district, the Board having already obtained an electric lighting Provisional Order and a site for the erection of a generating station.

AT a recent meeting of the Whitechapel District Board the Chairman informed the Board that Messrs. Dyson, the Board's parliamentary agents had written the Clerk informing him that the Board of Trade had communicated to them the fact that the Electric Light and Brush Company had withdrawn their application for an order to light the district with electricity. The Special Committee reported having visited various installations, and spoke very highly in favour of the system at Brighton.

AT the meeting of the Hampstead Vestry last week Mr. A. P. Johnson, the clerk, reported that the profits on the Vestry's electric lighting undertaking for the past year had exceeded all expectations. The revenue for the year amounted to £8081 0s. 9d. They had paid £2980 8s. 3d. interest on capital, and they had also repaid £1187 12s. 10d. instalments of capital, leaving the net profit of £3905 3s. 4d. Sir Henry Harben, the chairman, pointed out that if the Vestry were a trading corporation, and had not to repay the capital by instalments, the profits for the year to rank as dividends would exceed £5000. The total amount of capital expended up to the present is £100,167.

THE Sheffield Municipal Authorities have just had an unusual experience in civic administration. Some time ago the City Council unanimously decided to acquire the undertaking of the Electric Light and Power Company. Terms were arranged, and the usual meeting of the ratepayers called to approve the promotion of a Bill for the purpose. The whole subject, says the *Engineer*, was regarded as a foregone conclusion, and very few ratepayers turned up. The result was that a mere handful of electricians in the city outvoted the City Council, and, it may be added, the City Authorities had to take a poll. The poll was taken on Monday, and the votes counted on Tuesday, when the result was:—For Corporation purchase, 28,130 votes; against, 1965; majority for purchase, 26,155. The poll cost £1000. The moral is that Public Authorities should never be too sure of success, or under estimate the power of those whose private interests may be affected by municipal enterprise.

HOW ADULTERATION OF DAIRY PRODUCE IS DEALT WITH IN FRANCE.

VERY slow progress and very feeble attempts are made in this country towards protecting consumers against dairy produce adulterations, which are undoubtedly one of the worst forms of food adulteration which the Legislature has to contend against.

In France they are putting forth greater efforts to check this growing evil than we are, and the effects of the new French margarine law will be watched with great interest by the dairy farmers of this country.

It appears that the main object of the new law is to prevent fraud by establishing a distinction between butter and margarine so clear that the purchaser cannot be deceived as to the character of the product offered to him.

Butter is defined as the product of cream or milk alone, with or without salt. The introduction of any other substance into butter renders it legally margarine. In order to render the two commodities entirely distinct in appearance, the colouring of margarine is entirely prohibited. Moreover, it is sought to establish a complete separation between the two industries and the two trades, and even in markets the two commodities are to be sold in separate divisions. Then there are stringent regulations as to the character and condition of substances to be used in the manufacture of margarine. This last is a very necessary provision, in order to protect people from being induced to eat most objectional compounds, but it appears to the writer that the great difficulty will be to enforce such regulations.

The magarine industry has grown to be a very lucrative business, and there is a very powerful moneyed influence behind it in this as well as in other countries. Yet the mixture of butter with foreign fat is practised solely for the purpose of increasing the value of fats, and some of them—the very cheapest and most objectionable fats—by the addition of good butter, so that it may take the place of butter to a large extent, and that at a relatively higher price; or for the purpose of passing it off in the market as butter.

For these reasons this practice ought to be everywhere regarded as an attempt to carry on a lucrative industry at the expense of the dairy industry, and of the less wealthy portion of the public.

Law Cases.

THE SMOKE NUISANCE IN GLASGOW.

A CASE of considerable interest to hotel-keepers has just been decided by Police-Judge Murdoch at the Glasgow Central Police-court. Mr. Charles Ulbrich, 569, Sauchiehall-street, manager of the Grand Hotel Company, was charged with having, on April 22nd, used a furnace (the same not being a household fire) so that smoke issued therefrom. He pleaded not guilty. The evidence for the prosecution was that two policemen watched the chimney of the hotel, which is an ordinary one, on the top of a four-storey building. Black smoke issued continually for seven, five, and five minutes—in all, seventeen minutes within an hour. There is a furnace and an upright boiler used for supplying hot water to the bath-rooms and the kitchen.

Mr. George Neilson, Procurator-Fiscal, contended that this was not a household fire, but a furnace in a commercial institution. He asked his Honour not only to convict, but to impose a smart fine.

An agent contended, on behalf of Mr. Ulbrich, that this was a household fire, and therefore exempt from the Act. They might as well say that a house in which lodgers were kept was a commercial institution.

Mr. Young, the assessor, said that the late Stipendiary Gemmel convicted the Western Club of a similar offence.

The agent said that this was a house within the meaning of the Act, and all its fires were household fires, from which smoke might be allowed to come to any extent. Formerly there were two small boilers, but in order that the supply of hot water might be improved this large boiler was put in lately.

The Magistrate said that they could not call this a household fire; it was a separate fire for a separate purpose.

The agent said that this was simply a hot-water boiler.

Mr. Neilson said that manufacturers wanted steam, and the accused wanted hot water; it was the same thing.

The Magistrate said he could not hold that this was a household fire. He therefore fined the accused 10s. 6d.

DISEASED MEAT AS FOOD.

THE matter of Rendell *v.* Hemingway came before the Court of Queen's Bench last week upon a case stated by the Stipendiary Magistrate at Bradford, and involved an important question under the Public Health Act, 1875.

Mr. TINDEL ATKINSON, Q.C., and Mr. LONGSTAFF appeared for the appellant; and Mr. LAWSON WALTON, Q.C., Mr. CARSON, Q.C., and Mr. CHITTY for the respondent.

The appellant carried on the business of a draper in town, and was proceeded against under the Act, for having on his premises the carcase of a sheep which it was said was unfit for human food, and was convicted and fined £5, and ordered to pay £4 18s. for costs. The Magistrate found, as a fact, that the sheep was intendad by the appellant for the food of himself, his family, servants, and workpeople, and that it was not exposed or deposited for sale, or being prepared for sale. The appellant contended that as it was not exposed or intended for sale, no offence had been committed, but the Magistrate thought he was bound by the decision of Mr. Justice Hawkins and Mr. Justice Stephen in the case of "Mallins *v.* Carr," and convicted.

The Court quashed the conviction, being of opinion that unless the meat was, under Section 116, which created the offence, exposed or intended for sale, or deposited for sale, no offence was committed, and that the case relied upon by the Magistrate did not apply, as the facts proved they were entirely different.

Conviction quashed accordingly.

Notes and Queries.

[Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C.

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

1097.—STREET: OWNERS FENCING PART OFF: DEDICATION.—"Constant Reader" writes:—"In our district we have a street one end of which is a *cul-de-sac*. The owners of the houses near the blocked end of the street have fenced off the ground opposite their houses, the fence extending across the street. Has the Local Authority any power to compel the owners to remove the fence, the street not being dedicated?"

Answer.—If the public have acquired an easement of passage over the part of the street now barricaded off the owners will not be enabled to maintain the obstruction, and they may be required by the Local Authority to remove it. Although the street may not have been adopted as a public highway, it may, nevertheless, have been dedicated to the public, notwithstanding that it was repairable by the abutting owners. It would have been of assistance if we had been furnished with particulars as to how long the street had been open to the public prior to its being barricaded off, and whether there was an evidence of dedication to the public use.

1098. — UNOCCUPIED HOUSES A NUISANCE: PROCEEDINGS.—"G. H." writes:—"In my district there are a number of unoccupied houses which are in a dilapidated condition, and which are used as urinals, closets, &c., and are in a very offensive condition. Will you please advise as to what steps ought to be taken to have the nuisances abated?"

Answer.—If it can be proved that there is a nuisance on the premises, or if the premises are a nuisance or injurious to health, proceedings may be taken under Secs. 91 to 94 of the Public Health Act, 1875, to have the nuisances abated. Proceedings may in the alternative be taken under the Housing of the Working Classes Act, 1890, Sec. 32 (2), for the express purpose of having them closed.

1099.—OVERCROWDING IN COTTAGES: NUISANCE: PROCEDURE.—"A. P." writes:—"In my district there are many cottages which are apparently overcrowded. Will you please inform me what powers the Local Authority have to deal with cases of overcrowding in such circumstances?"

Answer.—Sec. 91, Sub-sec. 5, of the Public Health Act, 1875, provides that any house or part of a house so overcrowded as to be dangerous or injurious to the health of the inmates shall be deemed to be a nuisance liable to be dealt with summarily, and proceedings should be taken under Secs. 94—96 of the Act.

1100.—NUISANCE FROM CESSPOOL OVERFLOWING.—"D. O. G. C." writes:—"Will you kindly tell me who is responsible for the abatement of a nuisance caused by a cesspool overflowing, the cesspool receiving the drainage from a block of three cottages. The cesspool is not on the land of the owner of the cottages. I have served a notice on the owner of the houses, by whose act, default, or sufferance the nuisance arises, but he has only cleansed the cesspool, and has not taken any steps to remedy the nuisance beyond this."

Answer.—In Meader *v.* West Cowes Local Board (61 L. J., ch. 561; L. R., 3 ch., 18) it was held that a cesspool was not part of a sewer, and that the overflow pipe leading therefrom was not a sewer for which the Board could be made responsible. The Local Authority should require the owner of the cottages to cleanse the cesspool at stated periods, or, if the Local Authority have provided their district with sufficient sewers, he should be required to abate the nuisance by connecting the drains of his houses to the sewers.

1101.—RAIN-WATER CISTERNS: PURIFICATION OF WATER.—"Cambrian" writes:—"I send you sketch showing a rain-water cistern of 80 gallons capacity, and a clean water cistern of 80 gallons capacity, also a small cistern or cylinder to receive or be filled up with a medium for cleansing the rain water for bath supply only. Please advise what material or medium can be used in cistern or cylinder for cleansing the rain water on its passage from cistern A into cistern B for supply to bath. Kindly give size of cistern B."

Answer.—The sketch submitted to us, and not reproduced, cannot be satisfactorily adopted in practice. The querist should obtain Greenwell and Curry's "Rural Water Supply," and study the matter more thoroughly. He might adopt Roberts' rain-water separator to exclude dirt, &c., from roofs, from entering the cistern, or if he were to communicate with some of the manufacturers of filters who advertise in our pages they would no doubt advise him. We regret we are unable to further advise on the information given us.

1102.—CORRUGATED IRON BUILDINGS: BYE-LAWS AS TO NEW STREETS AND BUILDINGS.—"Yorkshire" writes:—"The bye-laws as to new streets and buildings of this Council provide that 'every person who shall erect a new building shall cause such building to be enclosed with walls constructed of good bricks, stone, or other hard and incombustible materials, properly bonded and solidly put together.' Will you kindly advise whether corrugated iron buildings could be approved as being in accordance with the bye-law?"

Answer.—No. Such buildings could not be approved as in conformity with this bye-law. The words "other hard and incombustible material" should be read in conjunction with the clause "good bricks or stone," which implies materials of a similar substance, and precludes the use of corrugated iron. Moreover, the clause as to thickness of external and party walls provides that the least limit of thickness must be 9in., and it could not be maintained that a wall formed of corrugated iron could comply with this clause.

1103.—THE KNACKERS ACT, 1786: LICENCES REQUIRED.—"T. W. H." writes:—"Will you please advise me on the following:—A. advertises that he removes dead horses or any other kind of cattle on the shortest notice, also that gentlemen and others can have slaughtered on their own premises old favourite nags or other horses, if required. Does this constitute the carrying on of the business of a knacker? Should the premises be registered as a knacker's yard, where the flaying and cutting up is done?"

Answer.—The Knackers Act, 1786, which is now enforced by District Councils, as provided by Sec. 27 of the Local Government Act, 1894, provides that "no person or persons shall keep or use any house or place for the purpose of slaughtering or killing any horse, mare, gelding, colt, filly, ass, mule, bull ox, cow, heifer, calf, sheep, hog, goat, or other cattle, which shall not be killed for butchers' meat, without first taking out a licence for that purpose at the General Quarter Sessions," &c. (now the District Council), of the district wherein such slaughtering-house or place shall be situate. If the person slaughters the animals, and removes them to his yard to complete the slaughtering process, it appears to us that he is carrying on the business of a knacker, and a licence should be obtained for the yard where such is carried on. It may be observed that by 7 and 8 Vict., c. 87, s. 1, such licences are in force for one year only.

1104.—Disinfecting Powders: Composition of Required.—"W. H. C." writes:—"My Authority has for several years made its own carbolic disinfecting powder. We use Crich lime as a base, and mix commercial carbolic acid, 97 to 99 per cent., and carbolic disinfecting fluid in equal proportions with it, the whole being well screened and mixed. Will you kindly inform me what changes the lime and acid undergo, and whether the powder is of any real use as a disinfectant? The powder is strongly alkaline in reaction."

Answer.—As we do not know what is the composition of Crich lime, we are unable to give our correspondent the required information. We may, however, state that sulphate of lime, on account of its power of absorbing ammonia, is a deodorant, but cannot be regarded as an antiseptic; carbonate of lime and other insoluble metallic salts are inert. Quicklime (CaO) acts only as an absorbent, while slaked lime, or calcium hydrate, $Ca(OH)_2$, absorbs acid vapours and sulphuretted hydrogen, and therefore acts to a certain extent as a deodorant. Our correspondent should procure Dr. Rideal's "Disinfection and Disinfectants," 12s. 6d., which will be found to give him much useful information on the subject.

1105.—Construction of Bridge in Concrete.—"Inquirer" writes:—"It is just possible I may have to build a small concrete culvert or bridge over a brook in my district in the near future. Would you kindly tell me (1) What is the least rise I can give to a cement concrete arch, say, 7ft. wide between walls? (2) What thickness ought the side walls to be about 2ft. 6in. high? (3) What proportion of cement to ballast would you use? (4) Would it strengthen it to put any irons in the arch, say, ½in. square, bent over the same shape as the centre? (5) Could you name a book on concrete works, where obtainable, and the price?"

Answer.—(1) and (2) It is necessary to study the special features of each case before determining on the thickness of walls or arches, and also as to the rise to be given to any arch. Attention must be directed to the weight which the bridge will have to carry, whilst the nature of the ground must also be taken into consideration. (3) The concrete for the walls should be composed of six parts of ballast to one part of Portland cement, whilst that for the arch should be composed of four parts ballast to one part of Portland cement. If the concrete is to be made impervious, the extrados and soffit of the arch and also the inside of the walls must be rendered with Portland cement mortar, composed of two parts of clean sharp sand to one part cement. (4) One of the best and simplest methods of strengthening a concrete arch is to build it on the "Monier" system. This is a framework of wrought iron wire netting embedded in the concrete, and is supposed to possess advantages over the solid bar method of construction, whereby any expansion or contraction can be better distributed. (5) We recommend Potter's "Concrete: Its Use in Building," &c., price 7s. 6d., as an excellent book for the purposes required by our correspondent. The book may be obtained from the Sanitary Publishing Company, 5, Fetter-lane, London, E.C., post free, on receipt of the published price. Waddell's "Design of Ordinary Highway Bridges," price 17s., is also an excellent book.

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Vacancies.

BUILDING AND DRAINAGE INSPECTORS (LONDON, N., June 13th).—For the Hornsey Urban District Council. Salaries, £160 per annum. Mr. E. J. Lovegrove, engineer and surveyor, Council's Offices, Southwood-lane, Highgate.

BUILDING INSPECTOR (LONDON, W., June 11th).—For the Ealing Urban District Council. Salary, £2 10s. per week. Mr. Wm. Ruston, clerk, Public Buildings, Ealing, W.

BUILDING AND SANITARY INSPECTOR (BINGLEY, June 14th).—Mr. R. Armistead, clerk, Town Hall, Bingley.

BUILDING INSPECTOR (SWINDON, June 7th).—For the Swindon New Town Urban District Council. Salary, £130 per annum. Mr. Henry Kinneir, clerk, Public Offices, Swindon.

CLERK OF WORKS (WARLINGHAM, SURREY, June 14th).—For the Croydon Town Council. Salary, £4 4s. per week. Application forms to be obtained at the Town Clerk's Office, Croydon, and to be sent to Mr. E. Mawdesley, town clerk, Town Hall, Croydon.

COUNTY SURVEYOR (LEWES, June 24th).—For the Roads and Bridges Committee of the East Sussex County Council. Salary, £400 per annum. Mr. F. Merrifield, clerk, County Hall, Lewes.

CITY ENGINEER (CAPE TOWN, June 15th).—For the Corporation of the city of Cape Town. Commencing salary, £800 per annum. Messrs. Davis and Soper, 54, St. Mary-axe, London, E.C.

CLERK OF WORKS (BOLLINGTON, NEAR MACCLESFIELD, June 4th).—For the Urban District Council. Salary, £3 3s. per week. Mr. W. H. Radford, civil engineer, Angel-row, Nottingham.

CLERK OF WORKS (FARSLEY, June 6th).—For the Urban District Council. Salary, 50s. weekly. Mr. J. Iles, J.P., chairman of the Council, Farsley, near Leeds.

CLERK OF WORKS (STOWMARKET, June 13th).—For the Urban District Council. Salary, £3 3s. Messrs. Pollard and Tingle, 31, Old Queen-street, Westminster.

CLERK OF WORKS (NEATH, June 7th).—For the Rural District Council (Highway). Salary, 36s. per week. Application forms can be obtained from Mr. D. M. Davies, engineer and surveyor, 58, Water-street, Neath.

DISTRICT SURVEYORS (LONDON, S.W., June 9th.)—For the London County Council. Application forms, to be obtained at the County Hall, Spring-gardens, must be addressed to the Clerk of the London County Council, Spring-gardens, S.W.

ELECTRICAL ENGINEER (ABERDEEN, June 17th).—For the Town Council.—The salary will be £225 per annum. The Town Clerk.

ENGINEER, &C. (BIRMINGHAM, JUNE 13th).—For the Birmingham, Tame, and Rea District Drainage Board.—Salary, £3 3s. per week. Also an Assistant Surveyor. Salary, £2 10s. per week. Mr. J. Knight, engineer, Council House, Birmingham.

Contracts Open.

The dates given below are the latest up to which tenders can be received.

BURY ST. EDMUNDS.—June 13th.—Plant.—Mr. F. Hastings Medhurst, B.Sc., M.I.E.E., consulting engineer to the Corporation, Westminster-chambers, 13, Victoria-street, S.W.

PRINCES RISBOROUGH (NEAR HIGH WYCOMBE).—June 8th.—Sewers.—Messrs. John Taylor, Sons, and Santo Crimp, civil engineers, 27, Great George-street, Westminster.

STOCKPORT, June 8th.—Sewering.—Mr. John Atkinson, A.M.I.C.E., borough surveyor, St. Petersgate, Stockport.

CITY ENGINEER (CAPE TOWN, June 15th).—For the Corporation of the City of Cape Town. Commencing salary £800 per annum. Messrs. Davis and Soper, 54, St. Mary-axe, London, E.C.

TOTNES.—June 20th.—Sewage Works.—Mr. W. F. Tollitt, borough surveyor, Gate House, Totnes.

HALE (CHESHIRE). — June 21st. — Sewers. — Mr. J. M'D. M'Kenzie, 7, Market-street, Altrincham.

POULTON-LE-FYLDE (LANCS).—June 6th.—Sewering.—Mr. Thomas Gornall, Holly Bank, Poulton-le-Fylde.

TOTTENHAM. — June 7th. — Dust Collection. — Mr. Edward Crowne, clerk, 712, High-street, Tottenham.

CHESTER-LE-STREET.—June 8th.—Drainage Work.—Mr. H. Webb, surveyor, 15, Lumley-terrace, Chester-le-Street.

HEMSWORTH (YORKS).—June 8th.—Scavenging.—Mr. J. Beckitt Simpson, Ackworth.

CROMER.—June 10th.—Sewers.—Mr. A. F. Scott, Church-street, Cromer.

SOUTHAMPTON.—June 14th.—Sewerage Works.—Mr. W. B. G. Bennet, borough engineer.

ASHBY-DE-LA-ZOUCH.—June 25th.—Sewers, &c.—Mr. J. B. Everard, M.I.C.E., 6, Millstone-lane, Leicester.

CHARTHAM DOWNS (NEAR CANTERBURY). — June 30th.—Drainage Works, &c.—Mr. W. J. Jennings, architect, 4, St. Margaret's-street, Canterbury.

QUORN (LEICS.)—Scavenging.—Mr. Geo. White, Rose Cottage, Quorn, Loughborough.

COMPETITIONS.

CASTLETOWN (IRELAND). — June 9th. — Sewerage Works.—The Guardians invite tenders from competent engineers for preparing plans, specifications, and estimates for a scheme of pipe sewerage works for the town of Castletownbere. Sealed tenders, endorsed "Tender for Plans—Sewerage Works," will be received by Mr. M. J. Donovan, executive sanitary officer, Board-room, Workhouse, Castletownbere, up to twelve noon on June 9th.

FORMBY (LANCS), July 1st.—Sewerage Scheme.—The Formby Parochial Committee invite competitive schemes for the sewerage of a portion of the township of Formby. Premiums are offered amounting to £100 for the scheme considered first in order of merit, £50 for the second, and £25 for the third. Mr. J. H. Havelock Sutton, Piercefield-road, Formby. A professional assessor will be appointed to adjudicate upon the plans.

BAILDON (YORKS).—Sewage Purification Scheme.—The Baildon Urban District Council invite plans of a scheme for the purification of the sewage of the Baildon Wood Bottom, Baildon Green, Lower Holme, and Low Mill portions of the Council's district, to be submitted to the Local Government Board for its approval by 30th inst. The successful plans will be paid for, and commission will be paid when the scheme is completed. For further particulars apply to Mr. H. R. Huggins, clerk, Baildon.

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THE

Sanitary Record,

JUNE 10, 1898.

Notes.

A Sad Event.

A GLOOM was cast over the visit of the Association of Municipal and County Engineers to Yorkshire on Saturday last. The Yorkshire centre of this important society had invited a large body of members to its district meeting, and a visit was arranged to the extensive works which the Bradford Corporation have in progress in Nidd Valley for supplying the borough with water. After the members had inspected the Gouthwaite Compensation Reservoir, the company proceeded in a contractors' train along a light railway on the higher slopes of the valley. The train had not gone more than a quarter of a mile when Mr. Tulley, the highly respected Surveyor of Rothwell, near Leeds, fell off the truck on which he was riding. The train was stopped, but on being picked up the unfortunate man was found to be dead. It is believed that the heavy walk over the site of the reservoir caused heart failure. The sad occurrence cast a gloom over the proceedings, and the deepest sympathy was expressed for the deceased man's friends.

Lord Rowton and the London County Council.

How often is it the case that two classes of people wanting to do a good action, but not being able to agree upon some little detail, immediately fly "at one another's throats," and all the good is lost sight of through some imaginary wrong. This is just about what is happening between the London County Council and Lord Rowton's Company. Let us brush away all the legal quibbles, and see if there is really any need for disagreement. Some time ago Lord Rowton conceived the idea of providing a species of "hotel" for the poor man. He had visited the common lodging-house, and he realised how distasteful the customs therein prevailing must be to any one possessing the least sense of refinement or delicacy. Therefore he planned a large house where such might put up, and, above all, where they could enjoy the privacy of a room to themselves—in fact, be exactly the same as if they were putting up at a West End hotel. The house was built, and it "caught on" at once; and similar places have been established in other parts of the metropolis. So far as we can tell, there has never been any ground for complaint proved either against the conduct or the arrangements of Rowton Company's establishments.

"The Letter killeth, the Spirit giveth Life."

BUT the London County Council has its own ideas about the housing of the working classes, and it appears to think that the poor man has no right to the luxury of a "Metropole;" and because the needy, and otherwise homeless, are accommodated, therefore these places must be classed as common lodging-houses, and be subject to inspection by the Council's officers. The claim of the Council has been defeated in the Magistrate's Court, and also in the Divisional Court. Yet we hear a fresh attempt is to be made in the Court of Appeal. We regret such a decision, for it does appear to be a waste of energy and money. Even if it wins, instead of helping the visitors at these hotels—who are striving to assert their individuality and humanity—they will be stamped as part of that seething mass from whom all sense of decency and respectability appears to have departed. Shylock of old was entitled to "a pound of flesh," but in taking that he would have robbed Antonio of his life-blood. So the Council may obtain its desire, and make Lord Rowton's Homes common lodging-houses, but with that the accomplishment of a noble ideal will be thwarted, and the dawn of a returning manhood blotted out to those who are struggling to extricate themselves from the "submerged tenth."

Scarlet Fever at Redditch.

Now and then we come across original modes of procedure in connection with the working of public bodies. In fact, some appear to imagine that whilst it is their duty to administer the various Health Acts, they have a right to invent new conditions and formulate special instructions as to "how the thing is to be done." A case in point comes to hand from Redditch, the seat of the needle industry. It appears that for the past two years, a small epidemic of scarlet fever has been raging in the district. The Notification Act is in force, but there seems to be a difficulty in effecting the isolation of patients, and consequently little or no abatement is perceptible in the extent of the disease. The Medical Officer has over and over again urged the establishment of an isolation hospital, stating in a recent special report that "there was no place where patients could be sent to, and until there were means of isolation he could do nothing. In some houses there were seven or eight children with the fever. There was in some cases only one bedroom, and while this state of things existed he could do nothing in the matter." At last the Council decided to take action; but instead of securing a plot of land and erecting a temporary building, negotiations were entered into with two neighbouring districts to establish a joint hospital.

'Gagging' the M.O.H.

Now, perhaps, there may be strong economical reasons for taking this course—there generally are *before* a joint Board is formed, though they do not always work out quite so well in practice as in theory—but surely a town with 14,000 inhabitants should be able to secure a building at a somewhat less distance than six miles from its borders. However, we suppose the Council deem it the best course to adopt. But now another danger has arisen. It would appear that the Medical Officer is a very rash man, and some of the Council are fearful whether, when the doors of the hospital are opened, that he will at once fill the place with patients. Therefore, a special Committee has been appointed to settle who is to go to the hospital and who is to be kept out. What nonsense! How can a Medical Officer fight disease gagged and bound in this way? And we venture to think the Local Government Board will uphold his action if he ignores the existence of such a Committee. After all, what are to be the grounds for this "discriminating" action on the part of the Committee? All the ratepayers bear the burden of cost, and the rich have as much right to protection as the poor; and if any are excluded through the action of the Council we hope they will have the courage to challenge the legality of such exclusion.

The Aim of Education.

Gradually we are awakening to the fact that it is not sufficient to merely instil the rudiments of the "Three R's" in the minds of boys and girls. True education aims at developing any special capacity a child may possess, or strengthening any of its faculties at present dull or weak. In furtherance of this more modern idea, an interesting lecture was given the other evening by Professor Sully, at one of the summer meetings of the London Society for the Extension of University Teaching. Taking as his topic the "New Methodical Measurement of Children's Capacities," he emphasised the importance of parents and teachers giving, as far as possible, the closest personal observation to the habits of children in their earliest years. One of the most pressing and practical problems to be solved by the teacher was the best way to economise his own time and energy and that of the children by means of a more perfect arrangement of classes. There was a necessity for a different method of classification to the system of jumbling children together, which had hitherto obtained. Common objects, it was found, were more interesting to young children through their use than anything else. For instance, if a child were asked to describe a tree, it would probably say nothing of branches and leaves, but would explain it was a thing to shade one from the sun, or something to climb upon. In methods of play it was strange to see the enormous importance which children attached to ceremony, and in the case of dolls a child made almost a kind of fetish of ceremonial. Many remarkable instances were given of how "dullards" had been trained to become really intelligent scholars by dealing with them individually instead of in the mass.

The Increase of Lunacy.

It seems but yesterday that we recorded the enlargement of Canehill Asylum, and the opening of a new one at Claybury, in Essex. Following closely upon these, it was announced that the London County Council had secured a site near Epsom upon which another was to be erected. In fact, this building is already in progess. Within the last fortnight two others are foreshadowed—one to be built by the Middlesex County Council, and one by the Borough of Croydon. This latter is necessitated by the fact that the agreement with London for housing the lunatics of Croydon expires next June. The site chosen is at Warlingham, Surrey, and will cost close upon £200,000. The increase of lunacy is one of the saddest features of modern life. We may rejoice in the more humane treatment given to those suffering from the "mind diseased," but our joy would be more complete if a "prevention" could be found, for that is better than "cure."

The Bryant and May Prosecution.

The cases of phosphorus poisoning in the match-making factory of Messrs. Bryant and May, Limited, which recently attracted the attention of the Home-office, and have now resulted in the prosecution and conviction of the firm, have a much graver significance than at first appeared. We use the plural advisedly, for though the conviction only related to the case of one person, a woman named Caroline Hawkins, there was no attempt to deny that this was only one of a series of cases that had been deliberately suppressed by the firm. By the special rules relating to lucifer match factories, framed in virtue of the Factory Act of 1891, notice of any symptoms of necrosis or swelling of the jaw must be given to the Medical Officer of Health as certifying surgeon; and the Factory Act of 1895 provides that written notice of every case of phosphorus poisoning shall

be given to the Inspector and to the Certifying Surgeon. Both of these requirements have been systematically contravened by Messrs. Bryant and May. Mr. Vaughan, the Inspector of Factories, stated that the factory had been under inspection for a number of years, and the firm always consistently denied the existence of necrosis in their works. The death of one of their employés, however, led to an inquest, and that to a wider and more searching inquiry, with the result that the firm ultimately made a clean disclosure, and gave up a list of similar cases under treatment by the Medical Officer of the works.

A Grave Offence.

Undoubtedly this was a very grave state of affairs. No attempt was made to deny the charge, and the only attempt at palliation was the statement that only one case had occurred since the framing of the special rules, and that case ended in death before the disease was diagnosed. The presiding magistrate, who was at first disposed to cavil at the laying of summonses under different sections of the Acts, all relating to the duty of notification, with respect to what appeared to be a single case, altered his view after hearing the facts, and characterised the offence as a very serious one, calling for severe treatment and the imposition of the full penalties under each section. We should be disposed to go further, and to say that such conduct on the part of the company indicated the most wanton indifference to the health and safety of their employés, and our only regret is that the penalties could not have been even heavier. There is one aspect of the case that demands some reflection. Mr. Vaughan said that, in consequence of the concealment practised by the firm, the Factory Inspectors had been led to believe that the special rules for the control of the factory and the notification of disease were working satisfactorily; and this compels us to ask the question: How long might such a systematic evasion of the law have continued had not the death of a workman led to a public inquest and an inquiry? And of what avail were the Factory Inspectors when a whole series of cases could thus escape their vigilance? It seems strange that, with our carefully devised code of laws for dealing with factories, it should be possible for employers to so hoodwink the Inspectors as to be able for a considerable time to ignore with impunity the statutory requirements on a matter regarding which the Inspectors should have been particularly on the alert.

The Inequalities of Fines.

We have had occasion more than once recently to remark on the disposition of some magistrates to treat lightly offences against the Food and Drugs Acts by allowing the offenders to escape with nominal fines that could only serve to encourage a repetition of the offences. We had another illustration of the same thing in Edinburgh last week. In two cases—one in which milk was sold deficient to the extent of 16 per cent. in natural fat, and another in which a mixture of coffee and chicory was sold when pure coffee was asked for—convictions were obtained, but the sheriff did not think there was any necessity for the imposition of a fine. It may be admitted that the offences were not of a very serious character still, if the Legislature has deemed it necessary to provide by statute for the checking of such practices, it is the duty of magistrates to carry out the intention of Parliament by enforcing the statutory penalties. By way of contrast with these cases we may observe the heavy penalties imposed in some milk adulteration cases in Glasgow the other day. In one case, where a farmer was convicted of several offences, all of the same character, the sheriff imposed the maximum penalty for each offence, amounting in all to £35. It was a heavy fine, and when we look to the character of the offences, and compare them with the much graver offences in Bryant and May's case, where the accumulated penalties with costs only amounted to £25 9s., we cannot help feeling that it was unnecessarily severe. But the chief thing that strikes one on this question of fines is the great inequality that prevails in different courts, a thing which is much to be regretted. It would be strange, for instance, if the farmer who was mulcted in the fine of £35 for milk adulteration did not smart under a sense of injustice when he read of the very similar case in Edinburgh, where the offender escaped without a fine at all.

The Late Lord Playfair.

In the death of Lord Playfair—more widely known, perhaps, by his old name of Sir Lyon Playfair—a singularly gifted and versatile man has passed from us. At a very early age he made his mark as a chemist of the first rank, for he was barely twenty-four when he received the appointment to the Chair of Chemistry in the Royal Institution of Manchester—that was in 1843—and in subsequent years he filled in rapid succession some of the highest posts the profession could offer him. In 1852 he was appointed Chemist to the Museum of Practical Geology, out of which arose the Royal School of Mines; in 1857 he was elected president of the Chemical Society; and the following year saw his appointment to the Chair of Chemistry in Edinburgh University. Of his parliamentary career and the distinguished posts he occupied in the public service in later years it is impossible for us to speak in this place. It is sufficient merely to allude to his having at various times held the offices of Postmaster-General and Vice-president of the Council, as well as many others of less importance. But Lord Playfair's claim on the remembrance of posterity will chiefly depend on the eminent services he rendered to the union of science and art in our manufactures and industries, to the promotion of which he was able to bring a rare practical knowledge of his favourite science. To take one instance out of many, his report to Government, in conjunction with Sir Henry de la Beche, on the various causes of explosions from gases in mines, was of immense value in suggesting improvements in the direction of preserving the lives of those whose lot is cast in the deep places of the earth. In his capacity of Joint-Secretary of the Science and Art Department he was able still further to promote the same end. But sanitarians will particularly remember with gratitude the services he rendered to the cause of public health. Lord Playfair's death removes the last member of the great Royal Commission on Public Health, which, it is not too much to say, laid the foundation of modern sanitary improvements.

THE CHEMICAL AND BIOLOGICAL ANALYSIS OF WATER.

By T. H. Pearmain and C. G. Moor, M.A.

Members of the Society of Public Analysts. Authors of "Applied Bacteriology;" "The Analysis of Food and Drugs," &c.

(*Continued from page* 586.)

MICROSCOPIC EXAMINATION OF SUSPENDED MATTERS.

CRUSTACEÆ.

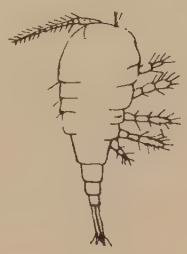
Bosmina longirostris (30).

Cyclops (31).

Daphnia (*water flea*) (32).

30

32



31

All these organisms are characteristic of pond water, and should not be present in a water supply.

INFUSORIA.

It may be said generally of the infusoria that they are characteristic of pond water.

Ceratium (33).—Fairly large infusorian. It is goblet-shaped, and has long projections or spines round the mouth part. The opposite end is drawn out into a spine.

33

34

Coleps (34) is a globular infusorian, looking like a basket, water having access through the meshes or pores of the body. It is covered with cilia, and has an anterior and a posterior opening, both surrounded by short spines.

Euglena (35).—It is a green animal containing chlorophyll, and lives wholly on vegetable foods. It has a long flagellum, at the base of which is a gullet. It has a contractile vacuole, and is actively motile.

35

36

Phasus longicandis (36) is a heart-shaped infusorian. At the anterior end is a single long flagellum. The posterior end is drawn out into a long spine.

Paramœcium bursaria (37).—Commonly called the "slipper animalcule." It is covered with cilia, and has a flattened form. The mouth is on the ventral side, a little to one side, and leads into a gullet. It has a layer of trichocysts below the ectoplasm (skin). These are pointed rods, which it ejects when irritated. It has two nuclei.

37

38

Polytoma (38).—It is the simplest of the infusoria. It is saphrophytic, and takes its food in solution, living in putrefying animal or vegetable matter. It has no mouth, and absorbs its food by the osmotic power of the body substance. It has two flagella, and there is a delicate invisible cuticle bounding the body.

Paramonas globosa (39).—Very small, heart-shaped, with one flagellum.

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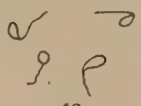

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Pleuromonas jaculans (40).—Small pear-shaped organisms with one flagellum.

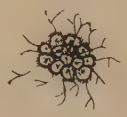
Stentor (41) is trumpet-shaped, and fixed by the narrow end. Body is uniformly covered with cilia, and at the front end of the body is a spiral layer of longer cilia.

41

42

Stylonichia (42).—It is shaped something like paramœcium. It has a strong layer of cilia round the mouth. The dorsal surface has no cilia, but has stiff hairs, which are really immovable cilia.

Synura uvella (43).—Forms round, irregular clups. Each individual is round and ciliated, and has one long bifid flagellum.



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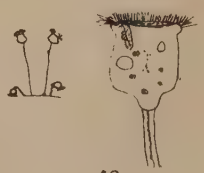
Trachelomonas cylindrica (44), *piscatoris* (45).—These organisms are bottle-shaped. At the anterior end is a single large flagellum set in a collar.

Vorticella (46).—This organism is cup-shaped, and is attached to the substratum by a long contractile stalk. The body has a lid, and both the lid and the opening into the gullet are strongly ciliated. The nucleus is horseshoe shaped.



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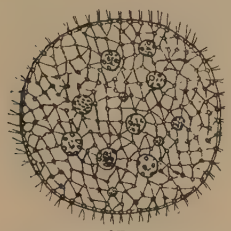
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Volvox globator (47).—Green, globular colony of individuals. The colony is spherical, and the individual creatures live in the wall of the sphere. Each has two flagella, a nucleus, and is green. The ball, or hollow colony, continually rotates by means of the flagella of each individual. This organism gives rise to a fishy taste and smell in water.

INSECTA.

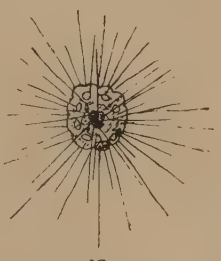
Tardigrada.—Commonly known as the "water bear." It has four legs, which end in stiff cilia, which help it to hold on to water plants. The head has no antennæ, and has eyes; the mouth is suctional. It is microscopic in size, and is found in pond water.

PORIFERA.

Spongilla fluviatilis.—The only fresh-water sponge. It grows in greenish masses in canals and fresh-water lakes. The sponge itself is an inch or more in diameter; the spicules are most likely to be noticed.

PROTOZOA.

Actinophrys sol (48).—This is a small round animalcule with one nucleus. It is surrounded by stiff, radiating pseudopodia. Found in pond water.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Amœba (49).—One of the simplest animals. It consists of a shapeless mass of protoplasm, which is constantly flowing out into blunt, uneven, lobose prolongations—the pseudopodia. It has no mouth, and the food is taken right into the protoplasm and digested, and the undigested part thrown out again.

Difflugia (50).—This organism has a coating formed by sand which it has taken into its body, and with which it makes a globular shell, inside of which is the soft protoplasm of the body substance. This flows out at the mouth of the shell and forms anastomosing threads, which catch the food of the animal, acting as a net.

50

51

Arcella (51).—This organism has a shell which partly covers it. On the flat ventral side is an aperture, through which the naked protoplasm exudes as lobose pseudopodia. In the body substance are seen vacuoles containing gas. These are hydrostatic in function.

ROTIFERÆ.

The rotiferæ generally are characteristic of stagnant water full of organic matter.

Anurea cochlearis (52).
Polyarthra platyptera (53).

52

53

54

Rotifer vulgaris (54).—The first to be discovered. Gives a red or green colour to gutter water. It is often called the "wheel" animalcule, on account of a circular, oral disc, which is fringed with cilia, which is motile, and by its movements conveys an appearance of rotation, and serves to propel the animal and to set up food currents.

VERMES.

Anguillula fluviatilis (55).—Characteristic of dirty water.

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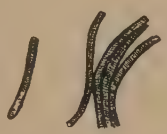
PARASITES AFFECTING MAN.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In addition to the various animal and vegetable organisms mentioned above polluted waters may contain undigested muscular fibres (56) or epithelial scales, or the various fibres of clothing—linen (57), wool (58), silk (59), and cotton (60).

57

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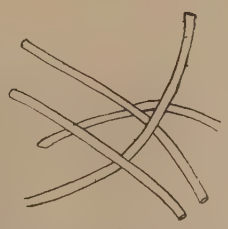
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In this country the eggs of the following para-

sites might be found in water:—Ascaris lumbricoides (or round worm), bothriocephalus latus, oxyuris vermicularis (thread worm), tænia mediocanellata, and tænia solium.

The ova of certain parasites which occur abroad are known to be conveyed by water, and while this may be the case with some of those common to this country, there does not appear to be any reliable information on the point.

(To be continued.)

LIME, MORTAR, AND CEMENT: THEIR COMPOSITION AND ANALYSES.

By W. J. DIBDIN, F.I.C., F.C.S,, &c.

(*Continued from page* 560.)

CHAPTER V.

TYPICAL ANALYSES OF MORTAR AND CEMENT.

During the past twenty years I have had many opportunities of analysing various samples of cement and mortar, and of the sand which has been adopted as a standard for use in testing the strength of cement—having been associated with the late Mr. John Grant, formerly engineer in charge of the southern district of London during the building of the main drainage scheme under the late Metropolitan Board of Works, and whose work on cement has for long been the standard of reference in regard to the mechanical tests, &c. From my results obtained in the course of this work, I have selected the following series of typical analyses from my note-book, and have added thereto the results of analyses of mortar which were first published in a paper read before the Society of Public Analysts by myself and Mr. R. Grimwood, F.I.C., &c., in 1896. As the value of this paper is greatly enhanced by the discussion thereon, I venture to print the whole *in extenso*, merely reserving that portion devoted to analytical methods for a later chapter, in which they will be more fully dealt with. Together, these analyses form a sequence which will be of interest and value to those who are desirous of ascertaining the character of samples which have been submitted to analysis, as by comparing the results found with the following they will be able to assign to the sample its proper position in the scale of quality. Thus it may be a mixture of good materials, or adulterated, or one, though honestly made up by the workman, has yet been mixed with poor materials. It is not intended to be conveyed, however, that the mere analysis of a particular sample will indicate the setting power of a cement. This, it will be at once seen on consideration, must be affected more or less, if not entirely, by the physical character of the cement, especially in regard to the manner of its burning, grinding, &c. A cement may contain all the ingredients of a first-class cement, but if it is not properly prepared it will be useless; just as a cook may throw together all the ingredients of a Christmas pudding, but if it is spoilt in the cooking, the result is a failure.

THE LEGAL SPECIFICATION OF MORTAR.

In the bye-laws made by the London County Council, under Section 16 of the Metropolitan Management and Building Acts Amendment Act, 1878, it is provided that the mortar used under that Act must be composed of freshly-burnt lime and clean sharp sand or grit, without earthy matter, in the proportions of one of lime to three of sand or grit.

In the case of cement-mortar, the cement to be used must be Portland cement, or other cement of equal quality to be approved by the district surveyor, mixed with clean sharp sand or grit, in the proportions of one of cement to four of sand or grit; also that burnt ballast or broken brick may be substituted for sand or grit, provided such material be properly mixed with lime in a mortar mill.

In the bye-laws made by the Council under Section 31 of the London County Council (General Powers) Act, 1890, it is provided that plastering or coarse stuff shall be composed of lime and sand, in the proportion of one of lime to three of sand, mixed with water and hair; but Portland, Keene's Parian, Selenitic, or other cement or plaster of Paris, may also be used for plastering. The lime must be freshly-burnt lime; the sand must be clean sharp sand, free from loam or earthy matter; the hair must be good and sound, free from grease or dirt, and one pound of hair be used to every three cubic feet of coarse stuff. Fibrous material may be used instead of hair, and ground brick or furnace slag, each to the satisfaction of the district surveyor, may be used instead of sand; and the setting coat must be composed of lime or cement mixed with clean washed sand, or cement only.

USUAL CHARACTER OF MORTARS.

Earthy Matter.—From these extracts from the bye-laws relating to the use of building materials in the metropolis, it will be seen that an analysis of lime mortar or cement mortar, &c., can be conducted with a degree of accuracy sufficient to indicate very slight departures from the prescribed quantities of the materials used. Unfortunately analyses which have been made from time to time by us (Dibdin and Grimwood) have shown distinctly that it is only under exceptional circumstances that mortars which come within these regulations are employed. To take one factor only, the earthy matter: analysis of samples of mortar, made with materials selected as coming within the definition of the bye-laws, and in the proportions therein set out, shows that the earthy matter, as determined by us in the manner described hereafter, varied as follows:—1·5, 2·1, 0·14, 0·74, 0·81, 0·61, 0·64, 0·96, 0·85, and 0·70 per cent.; thus showing that the finely-divided matters which may be accidentally introduced by means of the broken brick or sand form but a very small proportion of the actual weight of the mortar. As compared with these, the following results obtained from the examination of a number of samples of mortars taken from a building in course of erection will indicate the great difference in this respect, viz., 4·9, 3·8, 9·1, 3·4, 14·7, 13·7, 7·4, 10·4, 8·1, 12·3, per cent.

Soluble Silica.—Another factor of importance in estimating approximately the quantity of cement in a genuine cement mortar is that of the soluble silica. As is well known, the silica, soluble in hydrochloric acid, present in Portland cement will vary between 17 and 20 per cent.; but if the average is taken at about 18 per cent., it will form a fair basis for calculation.

If the cement-mortar is made with good Portland cement, and clean well-burnt brick or sand in the proportion of one of cement to four of the grit, there will be about 3½ per cent. of soluble silica. In some samples of genuine cement mortar, the soluble silica was found to be 3·25, 2·5, 3·25, and 2·25 per cent.; as against these samples of genuine mortar made with lime gave soluble silica equal to 0·9, 1·0, 0·6 traces, and 1·1. If we now turn to the analyses of commercial mortars (see Table V.) above referred to, we find that the soluble silica varied as follows: 0·9, 0·7, 0·7; thus showing a very marked difference between this factor under different circumstances.

Carbonic Acid.—A third factor is the quantity of carbonic acid. Genuine mortars made with good materials were found to contain, after the mortar had been made for some three months, carbonic acid equal to 1·02, 1·36, and 1·06 per cent. of carbonate of lime; and the cement-mortars to contain carbonic acid equal to 2·86, 2·86, 1·04, 1·87, 1·45 per cent. of carbonate of lime. Freshly-prepared mortar made with good materials contained in two instances 0·3 and 0·4 per cent. carbonate of lime. Against these, the commercial mortars contained 6·42, 6·24, 7·39, 4·52, 8·9, 8·4, 8·0, and 4·5 per cent.; thus showing conclusively that this factor alone gave such marked indications of the character of the material that it would be almost impossible that a mistake should be made in estimating the character of a given sample of mortar or cement. It is to be noted that certain bricks contain carbonate of lime, and this should be determined before concluding that the mortar is made with old materials or insufficiently burnt limestone. In Table I. an instance is given of a brick containing 7·77 per cent. of carbonate of lime. The full details of these analyses are given in the tables at the end of the chapter.

TABLE I.

Sample of the Lime used in making Mortar.

	Per cent.
Lime (CaO)	78·40
„ carbonate	3·22
„ sulphate	0·64
Soluble silica, iron oxide, and alumina	12·85
Sand	4·80
Total	99·91

Sample of the Brick used in making Mortar.

	Per cent.
Moisture (loss at 212 deg. Fah.)	1·27
Lime (CaO)	1·99
„ carbonate	7·77
„ sulphate	1·03
Soluble silica, iron oxide, and alumina	3·60
Insoluble matter—crushed brick	78·77
Insoluble matter—fine (this had the appearance of having been burnt)	1·69
Total	96·12

Relation of Weight to Volume (Lime Mortar.)—In the bye-laws of the London County Council it is provided that the quantities are to be by volume, and not by weight; therefore the analysis, being stated by weight, must be converted into terms of volume. In order to show how this is arrived at, the following comparative analysis of a sample of mortar made with broken brick, specially prepared for this purpose, will make the point clear. The analyses of the lime and broken brick are given in Table I., and in Table II. that of the mortar made with one volume of lime and three volumes of brick. In this case the brick had some old mortar adhering to it, as would happen where old bricks are used.

TABLE II.

Sample of Mortar made with One Part by Measure of Lime and Three Parts Crushed Brick.

	Per cent.
Moisture, water of hydration, &c.	29·71
Lime (CaO) (= 16·06 commercial lime.)	12·85
Lime, carbonate	4·47
„ sulphate	0·61
Crushed brick	46·03
Iron oxide and alumina	2·80
Soluble silica	1·85
Earthy matter (this had the appearance of having been burnt)	0·70
Loss on ignition	0·98
Total	100·00

Commercial lime (containing 80 per cent. of CaO) to crushed brick, 1 to 2·29 by volume; to all other matters, 1 to 2·86 by volume.

In this it will be seen that the earthy matter was 0·70 per cent. in the mortar, and the lime (as pure lime) 12·85 per cent., equal to 16·06 per cent. commercial lime of 80 per cent. pure CaO.

The brick (Table I.), as already mentioned, contained 7·77 per cent. of carbonate of lime. Another instance is given in Table III. of the analyses of lime and mortar made therewith and good brick. In this the carbonate of lime was only 1·97 per cent. on the mortar.

TABLE III.

Analyses of Stone-lime and Mortar made therefrom.

	Stone lime.	Mortar. Lime 1: brick 3 parts by volume.
Moisture, water of hydration, and loss	1·86	31·23
Lime (CaO)	78·63	10·89
Carb. lime	0·93	1·97
Sulphate of lime	None	0·61
Iron oxide and alumina	4·30	3·55
Soluble silica	7·10	1·11
Sand and grit	Trace	45·99
Earthy matter	6·20	1·37
Loss on ignition	0·98	3·28
	100·00	100·00

A large number of experiments on different samples of ground-up brick and various samples of lime, &c., have shown that it is a safe guide, in determining the volume of the materials from their weight, to increase the weight of lime found in the analysis by one-fourth in order to raise the lime (CaO) obtained to the relative quantity of *commercial* lime, on the assumption that the commercial lime originally contained 80 per cent. of pure oxide of calcium. The correction from weight to volume is then made by again increasing the weight by one-fourth.

The following will illustrate the method:—
Equal volumes of stone-lime and of air-dry broken brick weighed as follows:—

Lime	...	...	17·38 grammes per 18·5 c.c.
Brick	...	...	21·13 „ „

(1) To convert weight of commercial lime to equal volume of broken brick, add one quarter of the weight of lime found to itself, thus: 17·38 + 4·34 = 21·72.

(2) By analysis this lime contained 78·63 per cent. of real CaO, and a mortar made with this lime on analysis gave 10·89 per cent. of CaO; therefore, to convert CaO in mortar into terms of commercial lime, for practical purposes add one quarter of the weight of CaO found in that quantity. Thus, CaO in mortar 10·89 per cent. + 2·72 = 13·61 commercial lime.

(3) By No. 1, 13·61 + 3·4 = 17·0 of CaO by volume.

(4) The ground brick used in making the mortar (Table III.) contained 6 per cent. of matters soluble in weak acid; therefore, to the weight of brick-grit actually found add 6 per cent., *i.e.*, sand and grit (brick). 45·99 (45·99 × 0·06 = 2·76) = 48·75.

(5) Lime to brick by volume: 17 : 49, or 1 : 3 nearly.

RELATION OF WEIGHT TO VOLUME (CEMENT-MORTAR).

Equal volumes of washed and dried sand and of Portland cement of specific gravity 3·15 weighed 21·7 grammes and 19·3 grammes respectively. Therefore the weight of cement found must be raised by one-eighth to obtain a factor which shall equal the sand in terms of volume.

Average Portland cement will contain from 17 to 20 per cent. of soluble silica. An average of 18 per cent. may therefore be taken, on which assumption the soluble silica formed may be calculated into terms of cement. Thus, the 3·25 per cent. of soluble silica found in sample No. 1, Table IV., would equal 18 per cent., or 19·25 per cent. corrected for volume. The sand and grit equalled 67·34 per cent.; therefore the ratio of cement to sand was 1 : 3·5. In sample No. 2 of the same table the soluble silica was 2·5 = 13·9 per cent. of cement = 15·6 by volume; the sand, &c., was 70·77 per cent.; the ratio consequently was 1 : 4·5. Sample No. 3 showed a ratio of 1 : 3·5, No. 4 of 1 : 5·6, and No. 5 of 1 : 4·8, the average being 1 : 4·4. The samples were stated to be from cement-mortars, made with 1 of cement to 4 of sand. Doubtless the difference is due to unequal mixing.

ABSORPTION OF CO_2 AFTER MORTAR IS MADE.

The crushed brick (see Table I.) including some of the silica, iron oxide, and alumina, would amount to 48 per cent., or 51·77 per cent., including 3·74 per cent. of carbonate of lime found on analysis to be present in the brick. The commercial lime used contained 3·22 per cent. of carbonate of lime, so that the above 16·06 per cent. would contain 0·52 per cent. These together will account for 4·26 per cent. of the carbonate of lime in the quantity found in the above analysis, showing that only 0·21 per cent. of carbonate of lime was formed between the times when the mortar was made and analysed.

(To be continued).

SANITATION OF COUNTRY HOUSES, VILLAGES, AND SMALL AREAS.*

By EDWARD TIDMAN, C.E., F.S.I.

THE author consented at the request of the branch chairman, Mr. Branson, to read a paper at one of the branch meetings, and, in doing so, thought that a paper treating the above subject would probably be acceptable from the Surveyor's point of view, many members of the branch holding dual appointments as Surveyors and Sanitary Inspectors, and to leave the Chairman of Council to deal with a subject more interesting from a Sanitary Inspector's point of view; trusting to the kind indulgence of the members if he travels over ground that to many must be somewhat hackneyed.

With regard to the "internal" fittings of the house, little need here be said, there being no appreciable difference in these arrangements, whether the house be in the country or in a town. The remarks thereon will therefore be limited to a description of the general principles to be adopted in either case, and may be shortly described as follows:—

As far as possible, the drainage should be kept outside the house, and should be constructed of salt glazed sanitary or cast iron pipes. The drains should be laid on 6in. of Portland cement, and, if constructed of stoneware pipes, be also encased IN 6in. of cement concrete, the author's rule being that the excavation shall be 7in. below the level of invert of drain pipe, and the drain 20in. wide for 6in., and 18in. for 4in. pipes. When cast iron pipes are used there is less fear of fracture, and the precaution of a concrete case may be dispensed with. Great care should be used to remove any cement that may have escaped into the inside of pipes in laying; the best remedy for this is to use the Hassall's patent single joint, which prevents the possibility of any cement escaping within the pipe, and allows of a good cement joint outside.

The dimension of the drains should be, for mains 6in., with 4in. branches, and, when complete, should stand a hydraulic test, according to circumstances, of 5ft. to 15ft.; falls should not be less than 1 in 50, unless some means is used for periodical flushing. There should be access chambers at all important parts, and it is better to have too many rather than too few. The outfall, whether into a cesspool, sewer, long outfall, drain, irrigation outfall, or what not, should be fitted with an accessible interceptor trap of a modern type, and from the house side of this accessible trap there should be a vertical ventilating pipe at or about the ground level, fitted with an iron non-return valve or not, according to circumstances. The outlet being formed by the soil pipe or independent vent pipe at or near the highest point of the drain with such additional vents, inlet or outlet, as may be necessary to secure circulation through the entire house drain and also the branches above, say, 6ft. from any "circulating" drain.

The soil pipe branches should pass directly from the trap of closet into the drain or soil pipe outside, and the soil pipe should have few or no bends or

* Paper read at the Northamptonshire and Adjoining Counties Branch of the Sanitary Inspectors' Association, at Northampton Town Hall, May 21st, 1898.

any obstruction to prevent the free flow of air, and should not be more than 4in. or less than 3½in. diameter, and where there is more than one closet or a soil pipe care should be taken to provide the necessary anti-syphonage or bye-passes to prevent syphonage of traps or gullies. All rain-water pipes, whether delivering into sewage drain or not, should be fitted with gullies and cast iron grids, the inlet being under the grid. The waste pipes from sinks, baths, lavatories, &c., should be trapped, and discharge either into channels leading to open gullies or into vertical pipe heads. Cistern overflows and safe wastes should have their discharges direct into open air. Closets should be next external walls, have ample light and air, even at the sacrifice of what may appear on the plan to be a more important matter. With regard to closets, sinks, and other internal fittings, these may be left very much to the taste of the occupier, with the exception that no "pan," "circular flush," or "wash-out" closet should be allowed under any circumstances. The author's practice is to have pedestal "wash-down" closets for servants and ground-floor closets, and either a "valve" or "wash-down" with full seat for most upper floors; only using such closet as permits access to the joints.

These essential points having been described, the elaboration of detail, the cost of fittings, the material and other matters of taste may be left to the individual concerned, to settle as he desires. When these points are noted, at the commencement of a building, the expense of a sanitary system so fitted is little in excess of the old and happily almost obsolete systems in vogue in the early part of the century. A word may here be said as to the systems of drainage and soil pipes, and they may shortly be described as three:—(1) The old system without interceptor and ventilator; (2) the system of little or no ventilation to underground drains, with buried traps at foot, but from which the soil pipe is cut off from direct connection with drain, and which is known as "Norman Shaw's System;" and (3) the system of interception and through circulation, as described in the essential conditions for perfect sanitation.

With regard to the first, this plan is practically now extinct in new houses, and little may be said of it beyond "that wherever it is found to exist in old houses the sooner it is altered and removed the better," and that it never should be fitted to any new house under any circumstances. With regard to the second, or "Norman Shaw" system, this seems to have developed from the difficulties found to exist in providing a suitable line for soil and vent pipes in erecting mansions of a certain style of architecture favoured by this architect and his contemporaries, and from the difficulty often found in improving existing houses fitted on the first-named system, without fixing what some people consider unsightly vent pipes; and this was done by putting in a buried P or S trap at the end of the drain formed into a trumpet mouth with brickwork and cement, into which the soil pipe delivers with open end. The soil pipe being cut off by an open head on the floor level into which the closet outgo delivers, by this means the soil pipe is open at both ends, and is ventilated without any so-called "unsightly" (?) vent pipes running up to the top of the building. There are modifications of this system by Buchan and others, but these are its salient points. With regard to the third, I need add little. It possesses all the good points of the others and none of the bad—except, maybe, the sentimental one of the unsightly vent pipe.

And now, having wearied you with a reiteration of much that you are fully conversant with, we will come to the outfall. In most rural dwellings there is a cesspool at the outfall, and when this exists, or is contemplated, too much care cannot be exercised in the choice of a site and in its construction.

CESSPOOL REGULATIONS UNDER THE MODEL BYE-LAWS OF THE L.G.B.

These regulations are exceedingly well suited to all cases of cesspool drainage, and should form the basis, with but slight modifications, of any specification where cesspool drainage is a necessity. The ventilation of the cesspool is the least clearly described, and it is to this that attention should be drawn. The author's experience has been that in cesspool ventilation the vent drain is invariably taken to the foot of a tree; when the pipe is very much "up a tree" as a ventilator, it is frequently of zinc or of cast iron, with a cement joint to sanitary pipe, and this, through the vibration and the movement of the tree in a gale, is broken off, with the result that the vent is, after all, on the surface. These vents the author always removes, and substitutes a cast iron column, fixed in a concrete base; thus fixed, it is not subject to the same wind pressure, and with its outlet ten, twelve, or fifteen feet from the ground-line, is always in good order and efficient, which the previously described system is not.

In some cases, the whole of the sewage and rainfall is conveyed by one drain outfall, in other cases, the "separate" system is adopted, by which the storm, rain, and subsoil is drained into tanks for domestic or garden purposes, and the fæces, urine, and slops is conveyed to the cesspool; the advantages of the separate system are that it avoids excessive dilution, and lessens the volume of sewage water to treat at the outfall.

Sewage must not (under the provision of the Rivers Pollution Act) flow into rivers, even from isolated dwellings in country places, or into canals, ponds, or lakes, until it has been purified from all noxious and foul matter by the "best practical and available means;" the amount of impurity allowable being not more than as described in the following table per 100,000 parts:—

Organic nitrogen ...	0·3	Dissolved matters.
Organic carbon ...	2·0	
Metallic arsenic ...	0·05	
Mineral	3·00	Suspended matters.
Organic	1·0	

The objections to treatment by subsidiary and precipitating tanks and methods are that, with few exceptions, they do not purify, they only "clarify," and depend for their working on employés, and hence little dependence can be placed on the regular and efficient working; even without considering the expense of chemicals, a tank is little more than a large cesspool, and without some of its advantages.

One system is to apply the sewage direct to the land by intermittent downward filtration, avoiding clay land as much as possible for the purpose. By this system, on suitable land, the sewage of 3000 persons may be successfully treated on one acre, but as the land must have rest alternately for two years, three acres should be provided, and will return

good crops of grass and vegetables. This system is adopted for the sewage of about one-fourth of the population of Paris, and on the author's visit to the sewage farm and gardens at Genevilliers, in 1892, he found excellent crops of fruit and flowers being grown without the slightest ill-effects to the district or unpleasant odours, the effluent passing off pure, sweet, and harmless into the Seine.

"Wide surface irrigation" is another system, this requiring about one acre per 100 persons. Whichever plan is adopted it should be placed at some distance from the dwellings, so as to avoid any idea of a nuisance, although, if well arranged and attended to, none will in reality exist.

There is a system of "sub-irrigation," which is very efficient in some soils. By this system the sewage is distributed to the land below the surface by pipes, those frequently used being 3in. field pipes with open joints, laid near the surface on a bed of porous material. The sewage flows out at the joints and percolates through the earth; when the land is close and of a clayey nature there are disadvantages in this, as it renders the earth cold and sodden, and should be arranged to work in sections. Where sewage is treated on the surface by wide surface irrigation, the site chosen should not be too flat or too steep, and should be laid in slopes; free soils require a gradient of 1 in 20 to 25 or less, dependent, of course, on the nature of the soil. There should be conduits from the cesspool or outfall drain. This may be covered or not, according to their position, and should deliver into distributing carriers, also uncovered. These carriers require outlets fitted with stops, irrigation outlets, or penstocks, to direct the flow and supply all parts of the soil evenly.

The "catch water" carriers follow the contour lines of the land, one under the other, with fall enough just to carry the sewage forward and distribute it over the land by the help of the "stops" and flows over several, being probably not entirely absorbed and purified when it at last leaves the land. This plan is the best when rye grass is grown. The pane-and-gutter plan is to divide the ground into wide beds, with but little fall, and is fed with gutters on the highest part. This requires the land carefully levelled to prevent sludge pools collecting and creating a nuisance. A third plan is to lay out the land in ridges and furrows in parallel straight lines, with carriers or gutters on the ridges, and stop to let out the sewage. These beds should be 30ft. to 100ft., and the slope 1 in 25 to 1 in 100. But probably the best is that used at Genevilliers, where the land is laid out for the sewage to pass down furrows between narrow ridges formed by a double-mould board plough, the space between being just wide enough for the rows of plants; when the crops are removed the rows are again split, and the land levelled for other crops.

Where irrigation in any form is impracticable, or only so to a limited extent, "precipitation" becomes a necessity, therefore some description of the various processes may be useful.

The chief methods in use are:—

(1) The lime process.—This is applied by using, say, twelve grains to the gallon, stirring and settling; the solid matters are left in the water, and the ammonia is lost.

(2) A B C.—Another process is known as the A B C, and is used in some large towns, but is not suitable for the purposes treated upon in this paper.

(3) Phosphate of aluminium and calcium.—These are added to the sewage, which curdles and coagulates the fæcal matter, and after settling in tanks the clear water is allowed to flow off, and the solids are dried; it is, however, not fit for rivers, yet is allowed to run into the Lee, in Hertfordshire, above the intakes of the London Water Company.

(4) Sulphates of aluminium.—This process is used at Coventry, and is a mixture of clay and sulphuric acid, 1 lb. to the 100 gallons, with common lime added; the water is then used over land cropped with rye grass and oziers.

(5) "Scott's" process is a lime and clay process, whereby the solids are precipitated and then dried and burnt, and made into Portland cement.

(6) "Webster's" method is to treat the sewage by electricity. Gases are formed which carry the solids to the top, the liquid is agitated, the gases set free, and the solids settle, and will not again diffuse through the liquid.

(7) A process which has claimed some attention is that known as the "International" process, and certainly has met with considerable success. The process is (*a*) to precipitate and deodorise the sewage in settling tanks by the aid of a magnetic precipitant and deodorant called "Ferrozone;" (*b*) to pass the partly-purified sewage effluent from the settling tanks through "Polarite" filter beds, which arrest any solids remaining in suspension, and oxidise and render innocuous the putrescible matter held in solution. Ferrozone is the trade name of a material, rich in salts of iron, alumina, and magnesia, and contains magnetic oxide of iron in a spongy and absorbent condition, which deodorises and disinfects the sewage, and causes subsidence of the suspended solids. Polarite is also a trade name for a material for filtering and further purifying the ferrozoned sewage from putrescible dissolved matter. It is black, hard, porous, magnetic, insoluble, and practically everlasting. The cost is given as one farthing per 1000 gallons treated for ferrozone and for polarite, the interest and working expense only on the cost of the filters, which for a mansion would represent a capital outlay of about £100.

THE HYGIENE OF CLOTHING.

IT is probable that man was originally a tropical animal, perfectly adapted to his environment in a physical point of view, the natural product of evolution under the conditions in which he lived. Since he has emerged from his primal state and extended his habitat throughout nearly all latitudes and climates and has become a garment-wearing animal a host of unnatural and insanitary possibilities has arisen. The question of clothing, what to wear and how to wear it, has an importance altogether aside from the social and æsthetic, and even from some of the ordinarily recognised considerations of comfort that commonly govern our selection. The hygienic choice of clothing, when it is not interfered with by conventional or economic or other factors, is usually a rule-of-thumb procedure, that takes little or no account of the chances or consequences of error. This is more especially true in our so-called temperate climates, where every extreme of temperature is experienced, often within the compass of a few days or weeks, or in some localities even a day. The result is a sacrifice

of human comfort, health, and even of human life, that is none the less formidable and real because it is unappreciated even by the victims themselves. The average layman's idea of hygiene is ordinarily that it is a matter that concerns diet, water supply, drainage, &c., and the subject of clothing is one of the very last that occurs to him under this head. The relative importance attributed to these other matters by sanitarians encourages this error, and it may be asked whether we are not guilty of forgetting or condoning some of the commoner sins against good health in this regard; our familiarity with them has led to their neglect. We change our summer and winter costumes, for example, according to the calendar or our individual whims and feelings, and the result is often a crop of lung and bronchial affections and the aggravation of those already existing. According to Rubner, the most recent writer who has treated the subject systematically, the average man is, as a rule, too warmly clothed in summer, and this, even with good ventilation, is an evil that should be avoided, and tends to increased perspiration and abnormal activity of the skin, which in many ways may lead to evil consequences. With ill-ventilated clothing confining the perspiration and its excretions, we have a condition that interprets itself, often to our unaided senses, as hardly more compatible in principle with perfect sanitation than is an undrained cellar sending its exhalations into the living-rooms above. The necessary removal of clothing at least once a day relieves matters somewhat, but the betterment is only in degree, not in kind, and is at best only temporary if the same undergarments are resumed the following day. The problem of a proper and thoroughly healthful and comfortable summer costume in our climate adapted to all the exigencies of weather and occupation is certainly a complex one, and it is perhaps too much to expect that it can be perfectly solved. The best we can look for, perhaps, is to reduce the possible evils to a minimum, not to abolish them.

The question of winter clothing is, according to Rubner, a simple one, the chief demand is for sufficient warmth; the excretory function of the skin is not so actively in evidence, and the difference of external and bodily temperature in itself is sufficient to effect or materially aid in such ventilation as is required. The external conditions themselves more directly indicate the needs than is the case in summer, and errors are less likely to be made.

It is in a variable climate such as ours that the hygiene of clothing needs most particular attention, and more especially in the changeable weather of the transitions from winter to summer and summer to winter. In the tropics one readily learns how to adapt himself to his surroundings, and as a rule the white race in those regions does not attempt occupations that are unsuited to his conventional costume, at least for any length of time. In the arctic regions, also, the clothing is rationally adapted to the climate, and the freedom from colds and lung disease experienced there is not altogether due to the absence of germs. It is in the middle latitudes, in temperate regions, with their wide ranges of temperature and changing seasons, that the choice of clothing becomes a serious sanitary problem too often neglected, but none the less important and worthy of earnest attention. The public is at present left too largely to its own devices as regards this matter, and while the result is not altogether as bad as it might be, it is certainly not an ideal one in a sanitary point of view.

BACTERIOLOGICAL v. CHEMICAL EXAMINATION OF WATER.

Dr. Dunham, in a paper read before the American Chemical Society last spring, stated the case thusly: "The chief aim of an examination of water with reference to its fitness for drinking is to learn whether it contains, or is likely in the future to contain, poisonous substances or the contagion of disease. The detection of mineral poison falls within the domain of chemistry. The actual isolation of specific bacteria of disease can only be done by bacteriological methods." This is perfectly true so far as it goes, but he has only stated part of the case of the chemist, and the smaller part at that.

Leaving out of the question the possible extent to which bacteriological examination may be pushed, the practical and usual examination consists of counting the number of bacteria per cubic centimetre, and searching for the typhoid bacillus and the bacillus coli communis. The latter, as a constant quantity in fæces, indicates sewage pollution. The typhoid bacillus is rarely found in drinking water, although almost positively known to be present. This leaves the colon bacillus as the main evidence of the bacteriologist of sewage contamination, and as he does not find the pathogenic germ he cannot do more than class the water as dangerous.

The chemist has very little to do with the mineral poisons in water before referred to, and finds them less often perhaps than the typhoid bacillus is found, but in the majority of cases can detect sewage pollution more certainly than the coli bacillus will indicate it, and he says the water is dangerous.

It should be remembered that the bacteriologist looks for something that is in suspension, while the chemist determines substances in solution. The bacillus may, in the case of well water, be temporarily filtered, while the soluble matters are not affected. On the other hand, the polluting matter may be so largely diluted that chemical tests will fail to reveal it, and yet there may be enough coli bacillus to give a positive indication.

MODERN SANITATION AND THE ANCIENT HINDOO RELIGION.

On March 25th Surgeon-Lieutenant-Colonel W. G. King delivered at Madras University a long and able address to the newly-admitted graduates in law, medicine, engineering, and arts. After appropriate exhortations to the members of each of the several faculties he urged the graduates as a body to remember that it was to them as educated fellow-countrymen that the people looked for guidance in the midst of doubts and perplexities as to whether Western civilisation was not incompatible with native religious opinions and customs. For instance, the advance of sanitary reform is almost entirely dependent upon the ability of the better-informed classes to influence the uneducated populace. "Those of you who have studied the learned shastras of your forefathers," he said,

"must have found ample room for opinion that not only is modern sanitation compatible with caste, but that caste itself, although allied with religious observances, is a magnificent and elaborate system of sanitation."

"But in the absence of the knowledge of Sanskrit in which these rules were conveyed, tradition, which has been the method of transmission from generation to generation, has led to no little distortion of the original dicta." For instance, the laws of Manu teem with minute directions as to the collection, retention, and withdrawal of water in a pure state, but unfortunately the perversion of the sense of the original shastras has led to wholesale pollution of rivers. In seeking to provide a public water-supply free from any form of animal contamination, the various Local Authorities do not introduce any innovation contrary to caste requirements, and act in strict accordance with the spirit of the shastras, and the same may be said with respect to the measures of segregation and disinfection during the present prevalence of plague, which, however, have been resisted on the assumption that they were inimical to caste. In fact, if there has been anything taught by caste, it is the necessity for segregation as an aid against the spread of disease, the conditions which determine the duration and nature of the segregation being clearly shown by the laws of Manu and the edicts of Vishnu. On this occasion, for the first time in Madras University, an Indian lady obtained a degree in arts.

RICHMOND AND ISLEWORTH ISOLATION HOSPITAL.

LAST week the Duke of Cambridge formally opened the new isolation hospital which has been erected between Isleworth and Twickenham by the joint Board of Richmond, Heston, and Isleworth. The buildings are almost hidden from the London-road amongst the orchard trees midway between Twickenham and Isleworth village, with Kneller Hall, the Royal Military School of Music, not far away to the north-west. The block of buildings, which has been erected by Messrs. J. Godson and Sons, of Kilburn, at a cost of £13,598, is from the design of Mr. W. J. Ancell, architect, of 3, Staples' Inn, London, who has personally directed the carrying out of the work.

The architect has made provision for 46 beds, of which 22 are in the large fever ward, 12 in small fever ward, 4 in an isolation ward, and 8 in convalescent ward. The entrance gates and lodges are placed at the end of the occupation road, by which the site is approached, and a forecourt leads centrally to the administrative buildings. Under the road a perfect scheme of sewerage has been carried out, connected with the Heston-Isleworth sewage farm. On the right at the north-east angle of the site and near the entrance is the convalescent home and discharging rooms, whilst deeper in the site towards the north is situated the small fever pavilion. The large fever pavilion is to the left of the administrative buildings, and midway between this and the small fever pavilion is the probationary block. These three pavilions have been planned so that they can be easily connected with the administrative block by means of covered ways, and wide roads for the ambulances lead from the gates to these buildings. At the extreme left of the site is placed the mortuary and *post-mortem* building, and to the right of this are the stables, laundry, disinfecting building, and the ambulance shed. Each pavilion is placed on a raised platform or terrace, and one foot above this is the general ground floor level of each ward. This will give a slight slope all round the pavilion, and by this means security from damp is obtained. Ample provision is made for future extension. All the wards are under direct supervision from the nurses' duty-rooms, and the provisions for heating and ventilation are of the most approved kind, as also are the arrangements for disinfecting clothing and bedding, and the steam laundry, mortuary, &c. In the fever pavilions, besides general wards, provision has been made in separation wards, either for paying patients or for acute cases where separation from the noise of a general ward is necessary.

A representative gathering assembled to meet the Duke of Cambridge, including the Mayor of Richmond, chairmen of District Councils, and a large concourse of Aldermen and Councillors.

Mr. PETER WATSON, J.P., after a few words of welcome to his Royal Highness, said the united population of the districts joined together was now about 60,000, and it was rapidly increasing, from which it would be seen that it was of the utmost importace that adequate hospital accommodation should be provided. Originally it was intended to have accommodation for forty beds, but it was found that forty-six could easily be provided, and the arrangement was altered accordingly. There were twenty-two beds in the large fever ward, twelve in the small fever ward, four in the isolation ward, and eight in the convalescent ward. Should additional accommodation be required in the future there was ample land available for an extension of the buildings. The total cost of the undertaking was under £17,000; and the hospital was conveniently situated for the district that it was intended to serve.

Following Mr. Watson's speech, an address was presented to the Duke, who then formally declared the hospital opened. After the inevitable photograph had been taken the company dispersed.

POLLUTING THE THAMES.—The Hambledon Rural District Council were on Saturday summoned before the magistrates by the Thames Conservancy Board for allowing the pollution of the tributaries of the Thames at Haslemere, Bramley, Wonersh, and Shalford. As steps are being taken to provide a drainage scheme, fines of £5 only were inflicted in the first three cases. At Shalford the matter has been dragging on for three years, and as there is no scheme the Council was fined £30.

WHOLESALE SURCHARGES IN RATES.—At an audit of the accounts of the Poor Law Union at Woodbridge, on Monday, Mr. W. Casson, the newly-appointed auditor for Suffolk, objected to the allowance which had been made to the extent of 30 per cent. to the owners of cottage property as illegal, and stated that he had found similar allowances being improperly made in every union which he had audited since he came to the district. He expected to have upwards of 500 surcharges in the county as the result of his half-year's work. The overseers present expressed great surprise.

Coming Municipal Men.

III.—MR. WILLIAM H. G. KIESER,

Assistant Borough Surveyer, Torquay.

MR. W. H. G. KIESER is a native of Torquay, and was educated at the Castle College, Torquay, where he obtained distinction in mathematics under the Cambridge Local Examinations. He was subsequently articled to Mr. Joseph Hall, Assoc. M. Inst. C.E., then surveyor and harbour engineer to the late Torquay Local Board, the articles being transferred to Mr. H. A. Garrett, Assoc. M. Inst. C.E., upon the removal of the former to take up the position of borough surveyor and waterworks engineer to the Cheltenham Corporation. During this period Mr. Kieser was successful under the South Kensington Science and Art Department in having works accepted for Art Teacher's Certificate and obtaining the post of assistant master at the Science and Art Schools, holding classes in building construction in addition to art subjects.

MR. WILLIAM H. G. KIESER.

In 1892 he was admitted a student of the Institution of Civil Engineers; in the early part of 1893 was appointed second assistant in the Borough Surveyor's department, and in the latter portion of the same year was appointed Assistant Borough Surveyor.

Mr. Kieser is a Professional Associate of the Surveyors' Institution, his drawings being retained for exhibition at that examination, and is also a graduate of the Incorporated Association of Municipal and County Engineers. The duties pertaining to the office he holds include the direction of office work in correspondence, preparation of plans, estimates, specifications, quantities, and supervision of execution of all works of road making and maintenance, paving, drainage, scavenging, lighting, maintenance of public baths, private street works, &c.; the examination of all plans for new buildings, inspection during construction, and testing of drains, &c., to same, the checking of wages sheets, preparation of reports on all matters, apportionments of costs of private street works; and in the absence of the Borough Surveyor he has taken full charge of the department on several occasions. As the Council executes its own work in its own workshops, as far as possible—employing a permanent staff of wheelwrights, carpenters, smiths, plumbers, painters, and other mechanics and labourers, the staff consisting of 120 men and 30 horses—it may be surmised that the office is by no means a sinecure.

During Mr. Kieser's connection with the borough, now extending over eight years, he has been associated with extensive works of drainage, chief amongst which are a system of surface-water drainage in the Avenue district, the laying of brick and pipe sewers to replace masonry culverts, and there has just been completed an extension of the main drainage system in the Upton district, involving a scheme for floods prevention, the whole of the plans, estimates, and specifications being prepared and the work carried out by the department by administration at a cost of £10,500. Some six years ago he drafted plans for and supervised erection of a temporary hospital for infectious diseases at the sanatorium as an addition to the permanent building, the maintenance of which rests with the Surveyor's Department.

He has also had much experience in street improvements, erection of public urinals above and under ground, laying out and maintenance of pleasure grounds (some 65 acres), maintenance and extensions of sea walls and foreshores, and every branch of a borough surveyor's duties in a first-class watering place. As affording some indication of the progress made by this popular resort it is worthy of note that during the past four years over 300 sets of plans of new buildings have been deposited for the approval of the Council, which include some 350 dwelling-houses, ten public buildings (bank, halls, clubs, &c.), and estate plans for five new estates, and exclusive of many additions and alterations to existing premises.

At the Torquay harbour very heavy and extensive improvements were commenced in 1890, and have proceeded continuously up to the present time, a total of £95,000 having been spent. They comprise the erection of a concrete groyne and quay wall, and the dredging with steam dredgers of the new harbour area thus formed, the laying out of public gardens upon the ground reclaimed thereby,

and the improvement of the Torbay-road adjoining by further concrete sea walls, and the formation and laying out of the Royal Terrace Gardens at the foot of the hill along which the road runs. The extension of quays and piers by timber piling and concrete walls, together with substantial masonry buildings for coal and fish stores, and a cargo shed in iron. The erection of a promenade pier 900ft. long, consisting of a timber deck carried on iron lattice girders and cast iron screw piles, and a timber landing stage for passenger steamships alongside, together with refreshment and waiting-room, lavatories, toll-boxes, bandstand, shelters, &c. Schemes have also been prepared for swimming baths, marine undercliff drive, new fish market, and extension of main sewer for purpose of draining a new building estate. The works now in hand comprise, in addition to the routine work, the erection of a four-cell refuse destructor, improvement of pier head by extension of shelters, &c., and erection of a new public urinal. It is pleasing to record, in conclusion, that on several occasions the members of the Council have expressed their unqualified approval of the manner in which Mr. Kieser carries out his duties.

LUNG COMPLAINTS AND THE SMOKE NUISANCE.

EVER since the causes of death have been tabulated in Halifax, says Dr. Ainley, Medical Officer of Health, Halifax, in his annual report recently to hand, those from the lungs have been shown to be a larger proportion of the total deaths in comparison with other towns. The remarks of Mr. Whiteley at the foot of his meteorological report may throw some light on this phenomenon. He says :—"These figures show that during the last twelve months the weather in Halifax has been colder and more damp, with higher rainfall and more rainy days than on the average in places near the same latitude ; as also that Halifax has had less sunshine than the others." The exact figures will show to what extent this is true. The rainfall at Huddersfield was 33·02in., Bradford 32·37in., Leeds 25·49in., and Halifax 34·04in. Compared with Leeds, Halifax has a very considerable excess of rain, and when one adds to this the very much lower temperature and a constantly smoke-laden atmosphere, one obtains the most perfect conditions for the production of those diseases of the respiratory organs which are so common in our midst. One could scarcely suggest that we should alter our geographical position, but the smoke, the most important factor of all, is within our control, or ought to be, and I have no hesitation in saying that if we had less the respiratory death-rate would be diminished. Not only does smoke aggravate such diseases as bronchitis by its irritant particles of carbon and sulphurous acid, but, as has been recently shown, intercepts or modifies those rays of the sun which destroy injurious micro-organisms and vitalise all that is healthy and good.

TATSFIELD, SURREY. — The Rural District Council of Godstone has instructed Messrs. Bailey-Denton, Son, and Lawford, of Westminster, to report as to the best means of providing an efficient water supply for the parish of Tatsfield.

Obituary.

SIR ROBERT RAWLINSON.

ONE by one the links connecting us with the early days of the present century are being snapped asunder, and the various professions and walks of life are losing those who were pioneers in the great changes which will ever mark this period as the most progressive in the world's history. The passing away of Mr. Gladstone, Sir Thomas Acland, and Mr. Spencer Walpole leaves but two men living who were in Parliament before the passing of the first Reform Bill. Following these, we have lost Lord Playfair—to whose researches and labours we are indebted for many useful discoveries—and Sir Robert Rawlinson, who has been described by some of the daily papers as the father of modern engineering sanitary science. Perhaps the title is hardly correct. He was a disciple of Chadwick, and the opportunities of his life enabled him to demonstrate in a remarkable manner the practicability of many of his great master's noble aspirations and theories.

Yet for all that Sir Robert was a wonderful man. Born two months after the late Mr. Gladstone, he inherited the indomitable Lancashire courage from his father, combined with the persistence of the Devonian from his mother. His educational advantages were of the most meagre description, and at an early age he had to help his father in the thousand and one details of a small village builder, working alternately as a stone mason, bricklayer, millwright, carpenter, sawyer, or navvy, as occasion might demand. Yet this was just the "grounding" to fit him for his after life. In an autobiographical note he says :—"When I was one-and-twenty I was residing at Liverpool, and entered the dock office under Jesse Hartley, the greatest dock engineer the world has ever seen. I remained there for five years, for the last three of which I was Hartley's confidential draughtsman and adviser. Then I went on to the London and Birmingham Railway, the Blisworth contract under Robert Stephenson. Stephenson was remarkably considerate, and indeed a gentleman, and treated me with almost brotherly kindness. I was in charge of the masonry. The railway was in a cutting about two miles long, and 60ft. deep through rock, with an intervening bed of clay, which had to be cut away and then filled in with masonry. I was then twenty-six."

But he was not destined to remain at railway constructing. At thirty he went back to Liverpool, taking charge of the Bridgewater Canal, and assisting in the building of St. George's Hall. In 1847 he took the world by surprise when he suggested that Liverpool should secure the Bala Lake for supplying the city with water. The people were not ready for such heroic schemes, but what was then deemed impossible is practically an accomplished fact to-day. The only difference is the water comes from Vyrnwy instead of Bala.

The year 1848, however, was the turning point in Rawlinson's life. On the passing of the Public Health Act, he definitely entered upon a career as a pioneer in sanitary engineering, up to that period a much neglected branch of the profession. He obtained an appointment as one of the first Superintending Inspectors under the Act of 1848, and at

Dover he made the first inspection in accordance with the provisions of the Statute, and wrote the first report. After this, he inspected a number of thickly-populated areas, including several of the principal towns of the kingdom. A widespread boon was conferred by the new system of main drainage which he planned for the use of towns, and which has been universally adopted. The deplorable condition of the British Army in the East during the Crimean campaign called for the serious intervention of the Government, and a Sanitary Commission was sent out early in 1855, as recommended by the then Board of Health, the members of the Commission consisting of Dr. John Sutherland, Dr. Hector Gavin, and Mr. Rawlinson. So terrible was the sickness which had to be dealt with that the number of men who were disabled by preventable disease amounted to more than one-third of the whole strength of the army which went out from England.

On arriving at Constantinople the Commission at once set to work, and the result of their labours is thus described by the biographer of Sir Robert in "Men and Women of the Time:" "Works were begun immediately, both at the great hospitals situated on the Bosphorus and at the camp in the Crimea, such as cleansing, ventilating, and furnishing purer water. The returns from the four great hospitals on the Bosphorus, containing upwards of 4000 sick British soldiers, showed March 17th, 1855, an average rate of mortality equal to 8·61 per cent. per month of the sick, which mortality was reduced by June 30th of the same year to 1·01 per cent. per month. In the Crimea, during the winter (1854—5) previous to the advent of the Sanitary Commission, the losses in some regiments at the front had ranged for three months as high as 70 per cent., a mortality unexampled even in the worst of any former wars; by the end of the summer (1855) the entire British Army in the Crimea was placed in a better state of health, and had a lower rate of mortality than it had ever experienced in barracks at home." For services like these Sir Robert Rawlinson received warm acknowledgment from many quarters, not only at home, but also from the German Emperor, Prince Bismarck, Count Moltke, and the Secretary of the Sanitary Commission of North America at the end of the Civil War.

Another field of energy, says a writer in the *Standard*, in which the late Sir R. Rawlinson laboured would seem somewhat removed from his functions as a sanitary engineer, though in reality there was no such severance. During the cotton famine caused by the American War, he was sent to Lancashire by Lord Palmerston's Government as Engineer Commissioner to organise, under the President of the Poor Law Board, "work for wages" amongst the distressed cotton operatives. The paralysis which had befallen a great national industry was happily turned to account by the execution of extensive sanitary works in the cotton districts, thereby conferring a permanent benefit on the population. The experience so gained had a yet further effect, by leading to the passing of an Act by which the Exchequer Loan Commissioners can advance money to Local Authorities for the carrying out of town improvements. The deceased engineer served on several Royal Commissions, and was engaged in numerous inquiries of a sanitary character. He was one of the Commissioners appointed to inquire into the best mode of distributing the sewage of towns, and applying it to beneficial and profitable uses. We find him reporting, many years ago, that the only safe mode of disposing of town sewage was to filter it through land. Its agricultural value, he remarked, would depend on local contingencies, but, where favourable conditions existed and works were cheap, the application of sewage for agricultural uses, he believed, would pay. Where conditions were not favourable, he suggested that a small rate in aid would be required. Some further light has dawned on the subject since that report was written, and the great hopes entertained at one time with regard to sewage irrigation have generally given place to methods for practically throwing the sewage away after first rendering it innocuous. "Filtration through land," Sir R. Rawlinson recommended as "the only safe method. If the rivers of England are to be purified it must be by intercepting canals to receive all fluid refuse, and convey it to land for purposes of irrigation." On this principle, he made the formidable proposition that "the River Thames requires intercepting canals through its entire length." But we have now chemical processes and a sludge flotilla, so far as London is concerned. It may be remembered that, at a time when the irrigation theory largely prevailed, Sir R. Rawlinson held an official inquiry into the existence of certain obstructions alleged to be created in the river channel by the discharge of the metropolitan sewage at Barking. The facts remained somewat obscure, though allegations abounded, and the controversy is now ended by carrying away the solid residuum to the German Ocean. In his latter days, however, even Sir Robert admitted that finality had not been reached in the best method of treating sewage, and he manifested great interest in recent important developments.

Sir R. Rawlinson had a wide official experience respecting the drainage of towns, the treatment of sewage, the construction of waterworks, and everything of an engineering character that had reference to the public health. When a Royal Commission was created to inquire into the pollution of rivers, he was appointed chairman, and he subsequently became Commissioner to grant certificates under the Rivers Pollution Prevention Act. He was also a member of the Army Sanitary Committee, dealing with all the health conditions connected with barracks, hospitals, and stations for the army, both at home and abroad. For nearly forty years he held the post of Chief Engineering Inspector under the Local Government Board, and on resigning the appointment he became vice-president of the Irish Board, from which he retired in 1891. He was created a C.B. in 1865, his knighthood being obtained in 1883, and the rank of K.C.B. in 1888. He was a member of the Council of the Institute of Civil Engineers, being its president in 1894, and a vice-president of the Society of Arts.

For the last few years, Sir Robert Rawlinson lived in retirement in a house at Kensington, crowded with pleasant memories and associations. His strength began to fail him this year, and he passed away on Tuesday, May 31st. He was buried on Saturday last at Brompton, and the funeral was attended by many of his former colleagues and the representatives of the numerous societies to which he had been attached.

DR. JOHN BARRITT MELSON.

THE death took place at Lapworth, last week, of Dr. John Barritt Melson, in his eighty-seventh year. He was the son of a Wesleyan minister, and, receiving his early training at the Woodhouse-grove College of that body, took an earnest interest in Wesleyanism throughout his life. He graduated at Oxford, and for a special dissection made while an undergraduate, was elected a Fellow of the Cambridge Philosophical Society. Dr. Melson was apprenticed and commenced his practice in Birmingham, and whilst Professor of Natural Philosophy and Hygiene at Queen's College, he had as students the late Archbishop of Canterbury and Dr. Westcott, the present Bishop of Durham. When quite a young man Dr. Melson was placed on the commission of the peace, and at the time of his death he was the senior magistrate for the city. At the request of Sir Isambard Brunel he made the differential calculus of the lateral oscillation of engine axles, and assisted him in devising improvements to prevent the wheels leaving the rails when travelling beyond forty-five miles an hour. About the same time Professor Faraday relegated to Dr. Melson the question of the economical value of electricity as a motive power. He was also the first to introduce into Birmingham photography, electro-plating, and telegraphy. He had the first daguerreotype that was taken, which attracted a considerable amount of interest more than half a century ago. He was well known, not only in Birmingham, but throughout the country, and was highly esteemed.

MR. WILLIAM ILIFFE, DERBY.

THE death occurred, on last Friday night, of Mr. William Iliffe, Medical Officer for the borough of Derby, and its startling suddenness made the sad news harder to realise for his many friends. He had been somewhat unwell for a few days past, but was able to attend to his duties as usual, and on Friday he expressed himself as feeling considerably better. He dined with his family at seven o'clock, and spent the evening smoking and reading. While sitting in his arm-chair, at about ten o'clock, he suddenly made a noise in his throat, and, without any other warning, fell back and expired. Medical aid was at hand almost immediately, but life was pronounced to be extinct, and Dr. Daniells, of Osmaston-road, led the coroner's jury at the inquest, which was held on the body on Saturday afternoon, to return a verdict to the effect that death was due to syncope. Mr. Iliffe, who was 53 years of age, was a native of Nuneaton, and before coming to Derby, some twenty-eight years ago, he held a staff appointment at the Birmingham Borough Lunatic Asylum. In 1876 he was appointed to the post of Medical Officer of Health for Derby, under the Act which had then just come into operation, but the salary was little more than nominal, and he engaged in an extensive private practice in partnership with his brother, Mr. Frank Iliffe, of The Wardwick, Derby. In 1895 the Corporation successfully endeavoured to secure his undivided services, and results have proved that a more competent or zealous director of sanitary affairs could not have been desired. Under Mr. Iliffe's fostering care Derby has assumed a very enviable place among the healthy communities of the kingdom, sharing with Brighton the honour of possessing the lowest death-rate.

TYPHOID FEVER AND ITS PREVENTION.

LECTURE BY DR. CHRISTOPHER CHILDS.

UNDER the auspices of the National Health Society, which has for its object the diffusion by various approved methods of knowledge of sanitation, the first of two lectures on Public Health was given at 20, Hanover-square, W., on Tuesday, by Dr. Christopher Childs, M.A., M.D. Oxon., D.P.H., Lecturer on Bacteriology in relation to Hygiene, at the University College, his subject being "Our present knowledge with regard to the Bacteriology of Typhoid Fever, and the application of this knowledge to the prevention of the disease." Sir Richard Thorne Thorne, C.B., M.B., F.R.S., the Chairman of the Council of the National Health Society, occupied the chair, and those present included a large number of lecturers, training students, and nurses. The lecture was illustrated by oxy-hydrogen slides, kindly lent by Dr. Slater and Dr. Spitter, of St. George's Hospital, and exhibited by Mr. Baker.

Dr. CHILDS said it was an honour and privilege to address the members of the National Health Society upon such an important subject, but at the same time he was glad to have the opportunity of speaking to those who, through the agency of that great Society, were engaged in the honourable task of instructing the people in the art and science of domestic hygiene and nursing. For he hoped to enlist their sympathy and co-operation, and the support of the Society in concentrating and increasing the efforts being made in various directions to exterminate this dread disease. At the present time in England and Wales alone between 5000 and 6000 people died annually from typhoid fever, and yet typhoid was an eminently preventable disease. If full and proper use were made of the knowledge now gained with regard to it, its causes and the means of prevention, not only might nearly 5000 lives be saved every year, but the prolonged sickness and suffering of some 30,000 to 50,000 individuals might be prevented, and the disease exterminated altogether. Everyone could help in preventing these terrible yearly sacrifices to ignorance and indifference by learning the ways by which typhoid fever spreads, and the means by which it may be prevented, by taking care to observe the necessary precautions with regard to cleanliness and disinfection, if a case of typhoid fever occur in a family amongst those under his or her charge; by making sure that his house and its immediate surroundings are kept free from pollution with foul matter and from those defects through which the typhoid fever poison may gain access to the inmates; by insisting that the soil on which he lives and the air which he breathes, or the water which he consumes, and other food, shall not be polluted through the carelessness or ignorance of others; and by giving support and encouragement to those engaged in trying to obtain more complete and effective legislation by which such pollution may be prevented. Typhoid fever, according to the best authorities, is caused by living creatures called typhoid bacilli, creatures so small that they can only be seen through the most powerful microscope, so small that millions of them may be crowded in a single drop of fluid or a few grains of soil. From a patient suffering from

typhoid fever the bacilli are given off in countless myriads, chiefly in the discharges from the bowel, but also in the urine; if these bacilli are allowed to find their way into the surroundings or into the food of man—such as soil, water, or milk—they can multiply with marvellous rapidity, from one to over thirty millions in forty-eight hours, and if they find entrance into the body of man they can multiply in the same way, and produce the disease we know as typhoid or enteric fever. These bacilli might be conveyed in various ways to individuals, such as handling the body, clothing, bedding, utensils, and other things which have been polluted with the discharges of the typhoid fever patients. Such cases, however, were rare, and need never occur if proper and sufficient care be taken with regard to cleanliness; the disease could also be conveyed through the air coming either from the soil or from drains, cesspits, and other deposits, which has been contaminated with the discharges from patients; through the ordinary food, especially drinking water and milk which had been exposed to air contaminated with the bacilli; it was probable also that the poison is sometimes conveyed through oysters and shellfish, ices, watercress, and other food materials which have been in contact with polluted water, and had not been boiled before being eaten. In spite of the additional knowledge which has been gained during the last forty years with regard to the nature and causes of typhoid, comparatively little has been definitely established with regard to the life history of the typhoid bacillus after it has left the body of the patient. This parasite has practically not been found in the surroundings of man, neither in air nor soil, nor water nor food, nor in the sewers or deposits of filth which constantly receive countless hosts of this bacilli, excepting in those cases where they have been implanted for the purpose of experiment, and in certain rare instances where they have been detected in connection with some typhoid outbreak. When this living poison contained in the discharges and urine of a typhoid fever patient has been committed to the drains, to the soil, or to the water, it is almost impossible to detect it again, or to learn what has become of it with the means and methods at present at our disposal. Consequently, almost the only protection from invasion by this secret foe after it has been removed from the patient lay in those precautions by which it is prevented from infecting air, soil, water, and food, and in those measures which are used, often with such imperfect success, for removing or destroying the typhoid bacilli after they had gained access to the body. On the other hand, up to the time when the typhoid poison has passed from under the charge of the nurse, we have it under our control and power; we know where it is, and the means by which we may utterly destroy its vitality and capability for mischief. The honour and responsibility of holding and guarding the first line of defence against this ubiquitous and destructive enemy belongs to the nurses and attendants upon typhoid fever patients, while the difficulty of detecting and battling with the foe after the bacilli has been allowed to pass the first barrier is multiplied to an incalculable extent. In his opinion sufficient attention has not been given to the prevention of typhoid fever, and the powerful means we possess for protecting ourselves by cleanliness and disinfection of the patient and his surroundings. For this reason he would plead that every facility should be given to nurses for the complete and economical disinfection of typhoid patients, and that systematic and complete methods should be adopted wherever typhoid patients are treated. He appealed to them and all nurses, as well as those interested in nursing, to realise the great responsibility incurred in nursing a typhoid fever patient, to recognise the power possessed of destroying the living poison before it can escape, and to neglect no precaution which will ensure the protection of others from the disease. The difficulty of studying the history of the typhoid bacillus after it has found access to drinking water, soil, milk, was that it becomes obscured by the innumerable other organisms which are to be found, and they render it impossible to separate the typhoid bacillus. It had been shown, however, by Professor Sidney Martin, that the typhoid bacillus may live and thrive and spread in soil for at least a year, under conditions obtainable in a laboratory, especially in polluted soil; whilst Dr. Robinson, of Sheffield, had shown that it exhibits similar powers in natural soil exposed to all the vicissitudes of climate and season which obtain in this country. The typhoid bacillus was not killed by prolonged freezing, but it is destroyed at about 60 deg. Cent. or 140 deg. Fah. in half an hour, and at the temperature of boiling water. In the dry state it could only be killed at higher temperature. This linen could be completely disinfected by boiling for several minutes to ensure complete boiling through every part of the fabric. The bacillus was also killed by moderately weak disinfectants, such as carbolic acid and perchloride of mercury. The latter alone could not be recommended for disinfection of any albuminous material unless some strong acid is also added to it, but in the absence of albuminous material 1 part of mercury perchloride in 1000 of the fluid soon destroys the bacilli. In clear liquids, such as broth and wine, 1 part of carbolic acid in 200 of the fluid will also kill. A solution containing 1 part of mercury perchloride in 500 of water may be used for the disinfection of the urine of a patient or washing the hands of the nurse. But in disinfecting linen, evacuations, &c., time must be allowed for complete penetration. In all cases it is imperative to err on the safe side and to employ far stronger disinfectants and longer time than may appear necessary. After studying the methods employed in most of the large London hospitals, the information being placed most courteously and freely at his disposal by the medical officers, matrons, and nurses, he had ventured to formulate a series of rules such as might be employed in hospitals or in private houses or cottages. Those rules did not pretend to any originality, but might be of service where systematic means for the treatment of typhoid fever patients did not exist. These rules dealt with the means for preserving cleanliness in every detail, disinfection, feeding utensils, &c., and Dr. Childs concluded by pointing out that the difficulty lay in the fact that the knowledge with regard to the typhoid bacillus did not permit of their speaking obsolutely about any of the things recommended, but the wisdom of taking every possible precaution was manifest.

Dr. Childs was heartily thanked for his lecture.

Sanitary Inspectors' Associations.

NORTH-WESTERN AND MIDLAND.

THE usual monthly meeting of the Association was held on Saturday last, the 4th inst. Mr. William Stansfield, chairman of Council, presided over a good attendance of members.

After the transaction of the routine business, the CHAIRMAN called upon Mr. J. T. Quinton, District Sanitary Inspector, Liverpool, to read his paper on "Combined Drainage: Drain or Sewer." The paper was of a most interesting and practical character, the writer evincing marked ability in the handling of an exceedingly difficult and complex subject.

Mr. QUINTON referred at the outset to the definitions of "drain" and "sewer," as given in the 1875 Act, and pointed out that it had taken something like thirty-two years to amend the definitions as originally given, and that when amended the difficulties had only been increased, as Section 19 of the Amendment Act of 1890 had made the law on the point even more absurd than before. A pipe which was used for the drainage of more than one building still remained a sewer, unless (1) written complaint had been made to the Local Authority that a drain was a nuisance or injurious to health; (2) that the houses drained by the pipes belonged to different owners; (3) that it was a single private drain; (4) that the said private drain was connected with a public sewer. The first, second, and fourth provisos were tolerably clear, but not so the third, the word "private" indicating that the framers of the Act appeared to have had cognisance of two classes of drains. Mr. Quinton then dealt with the question of combined drainage in the metropolis, and entered into the various definitions of "curtilage."

The second part of the paper was devoted to a consideration of the legal decisions which had been given on this much-vexed question, the full text of the judgments being given in the cases of Travis *v.* Uttley, Self *v.* Hove Commissioners, Hill *v.* Hair, Mayor of Eastbourne *v.* Bradford, Reg. *v.* Mayor of Hastings, Seal *v.* Merthyr Tydfil, and two local cases recently adjudicated on by the stipendiary magistrate of Liverpool. The well-known decisions affecting the metropolis in the cases of the Vestry of St. Martin's *v.* Bird, Pithow *v.* St. Leonard's Vestry, Shoreditch; Vestry of St. Leonard's, Shoreditch, *v.* Phelan; Kershaw *v.* Taylor, Appleyard *v.* Lambeth Vestry. Mr. Quinton pleaded, in conclusion, for the much-needed consolidation and simplification of the Public Health Acts.

At the close of the paper a discussion was initiated by the CHAIRMAN, and continued by Messrs. WM. URQUHART, N. COATES, W. WOODWARD, the HON. SECRETARY, &c., Mr. Quinton being warmly complimented on his "maiden" effort.

With Mr. QUINTON'S reply the proceedings terminated.

HULL.—As a precautionary measure against the introduction of small-pox into the city, the Guardians have decided that all tramps should be medically examined.

General News.

BOLTON.—A set of plans has been passed for new public baths to be erected at a cost of £5250, this being the first of a series to be placed in various parts of the borough.

WIVENHOE, ESSEX. — The Urban District Council, at a recent special meeting, unanimously resolved to apply to the Local Government Board for sanction to borrow £6000 for works of water supply.

EDMONTON.—The Urban District Council has decided, subject to the approval of the Local Government Board, that a permanent building for cases of infectious disease be erected at a cost of £6400.

BRIGHOUSE.—At the last monthly meeting of the Brighouse School Board it was reported that an epidemic of measles had broken out in the district, and that one of the schools had been closed in consequence.

ABERDEEN. — The Water Committee of the Town Council recently inspected three of the four irrigation farms on the Deeside. The Committee found everything at the farms in a most satisfactory condition.

LONDON.—The Corporation is about to appoint a Sanitary Inspector at a salary of £140 per annum. He will also be required to act as Inspector under the Food and Drugs Act. Further particulars may be obtained of the Town Clerk, at the Guildhall.

TYNEMOUTH.—A representative meeting of the property owners and ratepayers was held recently, when the following resolution was passed:—"That this meeting of the inhabitants of Spital Dene and Tynemouth protests against Spital Dene being made a deposit for the filthy town refuse of the borough."

SOUTHGATE.—The District Council has unanimously decided, on the recommendation of the Hospital Committee, that a permanent hospital be erected, in accordance with plans prepared, as soon as the necessary sanction has been obtained, at a cost of £6400, the Clerk to discuss with the Edmonton Council and others interested what arrangements it might be desirable to enter into with them.

LONDON.—Dr. S. Saunders, Medical Officer of Health for the City, in his last monthly report to the Corporation, stated that the death-rate was 15·4 per 1000 per annum of the population. Eleven notifications of infectious disease had been received in accordance with Section 55 of the Public Health (London) Act, 1891. Certain smoke nuisances had been reported, including three at the General Post-office and one at the Bank of England. At the markets and slaughter-houses 67 ton 16 cwt. of meat had been seized and destroyed as unfit for human food. The seizures were 1881 in all. The total quantity of meat delivered at the markets in the month was 35,577 tons. The weight of meat seized was much in excess of that for any corresponding previous period in late years. That arose from a large quantity of American pork having arrived in this country in a bad condition.

SOUTHAM. — The Rural District Council has called in Mr. J. E. Willcox, C.E., of Birmingham, to prepare a scheme for the water supply of the district.

BUCKINGHAMSHIRE. — The Newport Pagnell Urban District Council has accepted the tender of Messrs. G. Waller and Sons, of Stroud, for the new engines and pump, designed by Messrs. D. Balfour and Son, of London and Newcastle, required at the town waterworks, which, owing to their increased power, will enable the supply to be delivered in six hours.

DURHAM.—The scheme of water supply submitted by the Easington Rural District Council for Castle Eden Colliery has been approved by the Local Government Board. The water is pumped at Wingate from the sand feeder up into a reservoir, and then is to be conveyed a distance of three miles in cast iron main, when it will be distributed over the town. The scheme has been designed by Messrs. D. Balfour and Son, of London and Newcastle.

LONDON.—The Home Secretary has issued an order under the Factory and Workshop Act certifying that in his opinion the manufacture and decoration of earthenware and china are dangerous or injurious to health. Now the Chief Inspector can serve on the manufacturers of these articles notices either proposing such special rules or requiring the adoption of such special measures as appear to be reasonably practical and to meet the necessities of the case.

CRICH.—A few months ago the Belper Rural District Council invited competitive schemes for supplying the parish of Crich with water—a district containing about 3000 population. Ten schemes were submitted, engineers from London, Brighton, Birmingham, and Yorkshire competing. The Council decided that the scheme submitted by Mr. Harry W. Taylor, of Newcastle-on-Tyne, was the most suitable, and this was accordingly adopted. Mr. Taylor has been engaged as engineer for the execution of the work.

LANCASTER.—At the Lancaster Rural Council meeting, on Saturday, a letter was read from the Local Government Board stating that it was satisfied from the information before it, that the work devolving upon Mr. Jowitt, in his capacity as surveyor, did not leave him sufficient time to fulfil the duties of Inspector of Nuisances. The Board was further of opinion that a district comprising twenty-one parishes and townships, with 51,174 acres, should have a properly qualified man to devote his whole time to the work of an Inspector of Nuisances. The Council decided to take no action in the matter for the present.

DUNDEE.—An estimate of the amount of water used for police, public health, and sanitary purposes in Dundee, has been prepared by Mr. George Baxter, the Engineer. The total value of the water so used is £4183 3s. 4d., but the Town Council is only charged £1300 of this sum. For street watering, &c., water to the value of £147 is required; horse troughs cost for supply, £378; fountains, £285 (Albert Fountain, £180); police offices, hospitals, &c., £175; skating pond, £105; fish market, £55; and public baths and washing-houses, £554. The largest single sum charged is that for the supply of conveniences, £1632.

LLANIDLOES. — A Local Government Board inquiry has been held recently into the application of the Town Council to borrow £12,000 for the purpose of carrying out the scheme of Messrs. F. Beesley and Son for the water supply of the borough, and other improvements.

BEDALE.—At a meeting held on 31st May the Bedale Rural District Council had under consideration a scheme of water supply prepared by Messrs. Fairbank and Son, civil engineers, of York. The scheme is to collect the water arising from springs in "Keeper's Wood," about 1¼ mile from Bedale, and to conduct the same to a point close to Bedale, and to utilise the pressure thus gained to force up a part of the water by two rams working in series to a covered storage reservoir on high ground about a quarter of a mile north of Bedale, from whence it will flow by gravitation to supply the highest houses in the town. The usual valves, hydrants, and consumer services will be provided, and the cost of the whole scheme is estimated at £2850. The annual expenditure, including repayment of loan and interest, is estimated at £179. The Council approved of the scheme and authorised a special Committee to carry out the work.

Personal.

PROFESSOR R. W. BOYCE has been appointed an additional Analyst for the city of Liverpool.

MR. ED. ASTBURY has been appointed Inspector of Nuisances for the urban district of Buckley.

MR. J. CAMPBELL has been appointed Inspector of Nuisances for the urban district of Wallsend.

MR. W. J. E. DAVIES has been appointed Assistant Medical Officer of the Chelsea Infirmary.

MR. L. M. WITHERS has been appointed Inspector of Nuisances for the rural district of Rugby.

MR. H. D. A. ELLIS has been appointed Medical Officer of Health for the urban district of Ambleside.

MR. L. M. WITHERS has been appointed Inspector of Nuisances for the rural district of Crick.

MR. J. T. GREY has been appointed Medical Officer for the No. 4 district of Hollingbourn union.

MR. CHAS. G. SEXTON has been appointed Sanitary Inspector for the Kensington sanitary district.

MR. CHARLES J. MYERS has been appointed Medical Officer of Health for the rural district of Louth.

MR. THOMAS PIERCE has been appointed Inspector of Nuisances for the borough of Marlborough.

MR. W. A. MILLWARD has been appointed Inspector of Nuisances for the urban district of Llandrindod Wells.

MR. WEAVER, engineer to the Gloucester Corporation, has been appointed Borough Surveyor to the Lynn Town Council.

MR. J. W. HARDY, Assoc. Sanitary Institute, has been appointed Sanitary Inspector, Fruit Department, to the Hull Corporation.

DRS. A. NEWSHOLME, J. F. W. Tatham, and B. A. Whitelegge have been elected Fellows of the Royal College of Physicians of London.

THE Local Government Board has sanctioned the appointment of Mr. R. Arthur Thomas as Inspector of Nuisances for the Menai Bridge urban district.

MR. ROBERT DRYDEN, Edinburgh, has been appointed Sanitary Inspector, Water Officer, and Surveyor for the Dalkeith burgh, at a salary of £102 per annum.

THE Hexham Rural District Council has engaged Mr. Harry W. Taylor, A.M.I.C.E., of St. Nicholas Chambers, Newcastle-on-Tyne, to prepare a scheme for the water supply of Haydon Bridge, Northumberland.

THE Crewe Town Council has appointed Dr. Meredith Young, M.D., Mast. Surg., D.P.H., Medical Officer of Health, and Medical Superintendent of the Corporation Hospitals for a further term of three years, and has increased the salary from £300 to £350.

THE Local Government Board has sanctioned the appointment of Mr. Charles Brooks as Medical Officer of the Gerard's-cross district of Eton union, at a salary of £10 per annum; also the appointment of Mr. W. S. Dibbs as Medical Officer of the Hedgerley district, at a salary of £20 per annum.

Sewerage Schemes.

[TO MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

THE Stourport Urban District Council has decided to proceed with the trial of a sewage filter in the Bridge Meadow.

THE Local Government Board has sanctioned the borrowing of £2000 for the sewerage scheme at Carisbrooke, Newport.

THE Wigton Rural District Council has recommended the Parish Council to apply for £200 for sewerage works for Caldbeck.

THE Epsom Rural District Council has resolved to apply for a loan of £22,000 for the drainage of Cobham, in accordance with the plans of Messrs. Fredk. Beesley and Son.

THE members of the Garm and Ogmore Valleys Urban District Council have gone on a tour of inspection. They purpose visiting Exeter, London, and some other places, for the purpose of seeing how the various towns to be visited deal with sewage. The septic system is being advocated, and the Council has decided to see for itself the various systems at work.

THE Handsworth District Council has resolved to apply to the Leeds Corporation for permission to inspect the sewerage scheme in operation there.

AGREEMENTS and plans are to be prepared for the sewage disposal scheme at Warminster, according to a decision arrived at by a special meeting of the Urban District Council.

THE River Pollution Prevention Committee of Durham City Council has reported that it has instructed Messrs. Lomax, the engineers in connection with the city sewerage scheme, to forward the amended scheme at once to the Local Government Board.

THE Rural District Council of the Isle of Thanet has at length decided that Birchington-on-Sea, which is rapidly growing in public favour, shall be provided with an efficient system of sewerage, and have instructed Messrs. Bailey-Denton, Son, and Lawford, of Westminster, to report in detail thereon.

AT the last meeting of the Wimbledon Urban District Council the Road, Drainage, and Farm Committee presented the farm bailiff's statement of accounts for the year ending March 31st last. It showed a profit balance of £130 17s. 5d., the total receipts amounting to £1113 2s. 7d., and included the following:—Grass, 389 17s. 6d.; vegetables, £422 10s.; mangolds, £170 4s. 1d.; cows, calves, and milk, £88 11s.; osiers, £20. The principal item of expenditure was £807 12s. 4d. wages.

AT the last quarterly meeting of the Staffordshire County Council, the report of Mr. J. E. Wilcox, C.E., of Birmingham, with respect to the drainage of the county asylum was considered, and it was decided to carry out his scheme for an entirely new system of sewerage and surface-water drainage for the asylum at an estimated cost of £6000, the work being necessitated by the present unsatisfactory sanitary arrangements and the fact that the Stafford Corporation refuses to admit surface water into its new system of sewers.

A LOCAL Government Board inquiry has been held at Leicester in reference to applications by the Town Council for sanction to borrow £3600 for sewerage purposes, £797 for the purchase of land for the purpose of public baths, and £1310 for street improvements. With reference to the loan for sewerage, it was stated that the Corporation had determined to construct a main intercepting sewer along the Evington Valley, taking the sewage from the eastern side of London-road, and of buildings erected on the land through which the new sewer would run. At the present time the sewage from the eastern side of London-road had to be pumped to the Knighton pumping station, which it was now proposed to abolish. The new arrangement would be that the sewage would be carried by gravitation to the Belgrave Pumping Station, and thence pumped on to the Beaumont Leys Farm. It was estimated that by carrying out this scheme, and abolishing the pumping station at Knighton, there would be a saving of at least £200 a year.

THE Rural District Council of Penistone has decided to forward to the Local Government Board the plans and estimates of the Langsett sewerage scheme.

THE new Sale sewage works, constructed at a cost of some £26,000, which, for their size, are among the most complete of their kind in the kingdom, were formally opened on Wednesday, the 1st inst. Satisfaction is felt that the scheme, which for various reasons has met with considerable delay, has at length been put into operation, and no doubt is felt that the works will fully meet the requirements of the Mersey and Irwell Joint Committee.

THE long-pending dispute between the Brigg Urban District Council and Mr. Cary-Elwes as to the amount to be paid for five acres of land near the bank of the river Aucholme required by the Council for sewage works, has been settled by arbitration. Valuers engaged by the Council stated that the land was only worth £660, whereas Mr. Cary-Elwes's valuers put the amount at £1641. The award given by Sir John Rolleston, the sole arbitrator, is that the Council has to pay £963 12s. 6d. for the land.

THE main drainage of Dublin at the north side may now be said to be completed. The Clontarf section has been carried out with despatch. The heaviest part of this undertaking was the tunnelling under the Royal Canal and the Tolka. The work has now been finished along the northern line of quays, and the Kilmainham section is well advanced. There was a good deal of difficulty in dealing with this portion of the work, as provision had to be made for the emptying into the river of the existing drainage until the main sewers are completed and ready to receive the discharge. A commencement has now been made at the south side, below O'Connell Bridge. Messrs. H. and J. Martin, the contractors, are carrying on the work rapidly and well.

ON the invitation of Hospital-master Laing, convener of the Brechin Sewage Farm Committee, the Police Commissioners recently paid a visit of inspection to the sewage farm, where, by means of filtration beds, Mr. Laing has effected some very desirable improvements in connection with the purifying and disposal of the town's sewage. Samples were taken of the sewage as it enters the river at three different parts from the new settling ponds; also of the river pure and as mixed with the sewage. The samples have been submitted to an analyst, whose report will be awaited with interest, as some of the Commissioners, it is understood, are still somewhat dubious as to the benefit or otherwise to be derived from the new improvements, the money for which has been dealt out somewhat sparingly to the Sewage Convener.

NOTICE.—The Annual Subscription to this Journal has been raised to 12s. 6d. to all NEW Subscribers. NO ADVANCE will be made to our friends whose names were entered on our Subscription list prior to March 31st, so long as they continue to subscribe.

Lighting.

A LOCAL Government Board inquiry has been held at Watford with reference to an application for sanction to borrow £21,000 for electric lighting purposes.

AT a special meeting of the Peebles Town Council it was resolved to offer to buy the whole of the works and plant of the Gas Company at £157 10s. per £100 of stock.

IN spite of the opposition of the Gas Light and Coke Company, the application of the Barking District Council to the Local Government Board for an electric lighting loan has been granted.

A LOCAL Government Board inquiry has been held at Colwyn Bay relative to an application made by the Urban District Council for sanction to borrow £2000, for the purpose of lighting the promenade with electricity.

THE Dover Electricity Supply Company announce that from July 1st next the scale of charges will be revised. The reduction will be roughly stated from one-fifth to one-fourth less than the present prices to the average consumer.

AN Order has been issued by the Metropolitan Gas Referees to the effect that for the future the 10-candle pentane air-gas flame is to be used as the standard of measurement for illuminating power at the twenty-three gas-testing stations in the metropolis.

PROFESSOR KENNEDY, who has been retained by the Devonport Town Council, has visited the borough and considered the position of a site for an electric station, and is of opinion that the site adjoining and to the east of the Corporation property at Pottery Quay is large enough for the purpose, both for power and light supply.

IN connection with the prospective erection of the new gasworks at Granton by the Edinburgh and Leith Gas Commissioners, it has been arranged, we understand, that deputations of the Commissioners shall visit towns both at home and abroad to see the latest installations of gas plant for the manufacture of gas. Four deputations, with four members in each, have been nominated.

AT a recent meeting of the Brighton Town Council the report of the Lighting Committee was adopted, containing estimate of further capital required for 1898—9, and recommending that application be made to the Local Government Board for sanction to borrow for a period of twenty-five years, on the security of the general district rates, the sum of £56,300 for the purposes of the electricity undertaking.

THE Corporation of Leeds has obtained its Order for the taking over of the undertaking of the Yorkshire House-to-House Electricity Company, Limited.

A LOCAL Government Board inquiry was held at Darwen recently into an application by the Corporation for powers to borrow £30,000 for electric lighting, and other sums for other purposes.

AT a recent meeting of the Wimbledon Urban District Council Mr. A. H. Preece submitted his report and plans on the question of the combination of the refuse destructor in the boiler-house of the electric light works. The total estimated expense was £4650. It was decided to make an application to the Local Covernment Board for sanction to borrow £5000. A number of tenders were recently obtained by the Surveyor from certain firms for the electric wiring of the depôt buildings in Queen's-road, but the Council has resolved to return these tenders and advertise generally for estimates. The cost is about £150.

THE Monifieth Gas Light Company, Limited, has been formed with a capital of £5000, divided into 1000 4 per cent. cumulative preference shares of £1 each and 4000 ordinary shares of £1 each, all of which are offered for subscription, but in regard to the latter it is proposed meantime only to take payment of 10s. per share. The object of the company is to acquire ground, property, and other subjects, and erecting and establishing gasworks, with all the necessary equipments for manufacturing and supplying gas to meet the requirements of householders, merchants, and others within the burgh of Monifieth and neighbourhood, and to supply public lighting.

WE learn that the Board of Trade has issued a Provisional Order to the Urban District Council of Barnes empowering it to supply electricity throughout the whole of the area within its jurisdiction, but excluding Hammersmith-bridge. The Order contains the usual provisions limiting the profit to be made by the Council to 5 per cent., and for the application of the surplus to the improvement of the district or to the reduction of the capital moneys borrowed for electricity purposes. The Board reserves the right to revoke this Order should the Council fail to lay distributing mains through certain specified streets within two years from its confirmation by Parliament.

THE Board of Trade has issued Provisional Orders to the Vestry of Bermondsey and the Vestry of St. Marylebone, empowering these bodies to supply electricity "for all public and private purposes" throughout the whole area of their respective districts. The Order sets forth a list of the streets along which distributing mains must be laid within a period of two years, and it is provided that in the event of the surplus revenue exceeding 5 per cent. on the capital expended on the works, the Vestries "shall make a rateable reduction in the charge" for electricity. The surplus is to be devoted to local improvements, "or in reduction of the capital moneys borrowed for electricity purposes." These Orders will not come into operation until they have been confirmed by Parliament.

Law Cases.

IMPORTANT PROSECUTION UNDER THE FACTORY ACT.

AT Worship-street Police-court Messrs. Bryant and May, Limited, were summoned before Mr. Corser by Mr. Vaughan, an Inspector of Factories, as the occupiers of a factory in which a contravention had occurred of a special Rule (VI.) made under the Act, the said factory being established for the manufacture of lucifer matches. Two other summonses complained that notice of a case of phosphorous poisoning to a woman named Hawkins had not been given to the Inspector and to the certifying surgeon of the district respectively.

Mr. Gilbert Bartholomew, managing director of the company, appeared to the summonses, and said he pleaded guilty.

Mr. Vaughan stated that the summonses were in respect of a woman named Caroline Hawkins, the Act of 1891 requiring that notice should be given of any symptoms of necrosis or swelling of the jaw occurring in any factory for the manufacture of lucifer matches to the Medical Officer of Health, as certifying surgeon, and the Act of 1895 required that on the presence of any certified disease of the kind notice should be given to an Inspector under the Act. For the breach of those requirements the company was summoned.

Mr. CORSER said he should not impose a fine for both offences in one case, otherwise a defendant might be fined on every section for one case.

Mr. Vaughan agreed, but pointed out that there were two offences, though there was only a slight distinction. He then said that though the summonses were taken only in respect of Caroline Hawkins, it was only one of a long series of cases which had been deliberately suppressed by the firm. He used the term with its full meaning, because the factory had been under his inspection, and that of other Inspectors for years, and from time to time denials of any cases of necrosis were constant. Then a man died, and an inquest disclosed the cause of death, and then the fact was admitted, and when further inquiry revealed that there were other cases the firm made a clean breast of it, and a long list of persons suffering and under treatment by the Medical Officer of the works was handed to him (Mr. Vaughan). There were eleven cases in all, but in consequence of the overt acts of the firm, the deliberate suppression of the facts, the Inspectors of Factories were led to believe that the special rules for the control of the factory and the notification of the disease were working satisfactorily. The reason the other cases he had referred to were not proceeded upon, was that the prosecution was limited by the Summary Jurisdiction Act to offences within the preceding six months. Had they been reported as required, some fortification of the special rules might have been made. He felt that this was a serious charge against Messrs. Bryant and May, as the firm was well known and extensive. But having regard to the number of cases and their suppression, he felt that he ought not to minimise the matter at all. In conclusion, he pointed out that the breach of the special rules carried a penalty of £10, and the neglect to give notice, £5.

Mr. Bartholomew said he could say nothing in

answer to the statement, and was sorry the offences had been committed. He wished, however, to point out that only one of the cases to which reference had been made had occurred since the special rules were passed, and that that ended in death before the diagnosis.

Mr. CORSER said that he agreed that it was a serious case, and having heard the facts he felt that a penalty should be imposed in respect of each default. He imposed the full penalty, £10, with £5 5s. costs, for the neglect under the special rules, and fines of £5 and 2s. costs on each of the other two summonses.

THE DRAINAGE OF COBHAM.

A CASE of some importance came before the Surrey county bench on Thursday of last week. The Epsom Rural District Council was summoned by the Thames Conservators for neglecting to abate a nuisance caused by the outfall of sewage from Cobham into the river Mole, a tributary of the Thames; notice of the nuisance and an order for its abatement having previously been served.

Mr. Bunting represented the Thames Conservancy Board, and Mr. Barnard Lailey appeared for the defendant Council.

Mr. BUNTING said that the summons was fully heard in June of last year, and the case was adjourned to give the defendants an opportunity of remedying the evils complained of.

Mr. BARNARD LAILEY said he would prove to the satisfaction of the Bench, and he thought also of the Conservators, that as much had been done by the Council in the time at their disposal as was possible to remedy the nuisance, and to provide an efficient scheme of drainage for Cobham, whereby the nuisance occasioned by the outfall of sewage into the river Mole would be mitigated. In addition to that the Council had set about borrowing a large sum of money to obtain possession of the land, until which time the scheme could not be carried out. The Council was prepared to pay any reasonable amount for the land, but the amount asked had been so greatly in excess of their surveyors' estimates that the Council had felt bound to refuse the offer. It was therefore necessary for the acquisition of the land to obtain compulsory powers. With regard to the loan which it was proposed to borrow, the Local Government Board had received the application of the Council, and the Council was now powerless to act, as the loan would not be granted before possession of the land had been gained.

Mr. W. O. Reader, solicitor, of Epsom, and Clerk to the Rural District Council, bore out counsel's statement as to the action of the Council. It had not been found possible to acquire the land by agreement with the landlord; and, until the land had been obtained, the Local Government Board would refuse to grant a loan of £22,000. As soon as the land could be obtained, the work would be commenced forthwith, as all plans had been prepared and approved. The Council had done all in its power to bring about the abatement of the nuisance. The Council's Sanitary Inspectors had been instructed to use their best endeavours to secure a mitigation of the nuisance, pending the carrying out of the large scheme.

The CHAIRMAN said the Bench were of opinion that such steps as could have been taken had been taken with regard to the acquisition of the land.

In cross-examination, Mr. Reader said he did not think it was necessary to send the detailed plans and sections to the Local Government Board before the matter could be taken further. Witness had seen one of the heads of the Local Government Board, and he had told witness that everything had been done by the Council towards securing the loan of £22,000 for the work.

Mr. Kiel, Sanitary Inspector to the Epsom Rural District Council, said he had a general order from the Council to do all he could to mitigate the nuisance, and had made frequent visits to the point of the outflow of the sewer, which was regularly cleaned out, and the general state of things was much better. There was no black, decomposed refuse as on the previous occasion.

Cross-examined: The Council had not spent any money in purifying the sewage, but the pits had been regularly cleaned out, and it was the matter in the pits that had been complained of by the Conservators.

The Bench considered it was very right and proper that the Conservators had brought the matter forward, and it had been shown that the improvement had been considerable. The summons would be again adjourned, and it was to be hoped that some definite steps would soon be taken in the matter.

Mr. LAILEY said the decision of the Bench would receive the close and immediate attention of the Epsom Council.

Notes and Queries.

[Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C.

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

1106.—DRAIN AIR-INLET VALVE: MAKERS OF.—"Inspector, L.G.B." writes:—"In your Supplement to THE SANITARY RECORD of January 15th, 1897, on page 5, you illustrate and describe Mr. F. J. Simmon's patent drain air-inlet valve. I have tried, but failed to obtain the address of this firm. As I have some urgent work in hand I shall be grateful if you can supply me with the address of this firm."

Answer.—The name and address of the firm in question is Messrs. Alex. Wright and Co., 34—40, Millbank-street, London, S.W.

1107.—WELL SINKING: POLLUTION.—"Q. H. E." writes:—"I have just finished sinking a well, which is about 14ft. deep, passing through 3ft. of earth, 6ft. gravel, 5ft. clay, and 1ft. 6in. of grey soft sandstone, the water being drawn from the latter. I now find that the water is unfit for drinking purposes. Every possible care was taken in construction to exclude possible pollution, the steining down to the clay being formed of 9in. radiating bricks, backed with a coat of cement and 9in. clay puddle outside, so that no local contamination can possibly affect the supply. What can be done in such a case? Would it be got over by sinking the well lower, and ignoring the existing supply—that is to say, keep it out of the well, and tap another water-bearing stratum lower down?

Does it necessarily follow that I should find water by going lower? Or, if this course of sinking deeper, is no good, can you advise me the best course to pursue? I may mention that the analysis states that the contamination probably arises from drainage or cultivated land. I enclose section of well."

Answer.—Without a fuller knowledge of the local circumstances, it is somewhat difficult to advise. Has the querist ascertained whether there are any sources of pollution, such as leaking drains or cesspools, closely adjacent to the well, and which may be removed? Or is the land around the well manured, and so liable to pollute the supply? The section submitted shows that an impervious formation of clay has been passed through in order to reach the water-bearing stratum. Is the bed of clay thus shown continuous and impermeable or otherwise? If the latter, it may be difficult to avoid pollution unless the efficiency of the well is increased by sinking deeper, or tubes are driven through the underlying bed of clay into the next lower water-bearing stratum, if such be known to exist at a reasonable depth. On this point, in the absence of local knowledge, we should advise that a geologist of repute be consulted—one connected with H.M. Geological Survey is generally to be preferred. It might be prudent to obtain another analysis of the water before proceeding further. Our correspondent might usefully procure Swindell and Burnell's "Wells and Well Sinking," price 2s., obtainable from the Sanitary Publishing Company, 5, Fetter-lane, London, E.C.

1108.—Smoke Test Machines: Makers of.—"G. F. C." writes:—"I should be pleased if you will let me know names of the makers of smoke test machines. I should prefer one with a fan."

Answer.—The following firms manufacture smoke testing machines for drains, viz.:—Messrs. Burn Brothers, 23 and 24 Charing-cross, London, S.W., makers of the "Eclipse" tester; Messrs. John Watts and Co., Broad Weir Works, Bristol, makers of the "Asphyxiator" tester; Messrs. Baird, Thompson, and Co., 165, Queen Victoria-street, London, E.C., makers of the "Grahtryx" machine; Mr. John Barron, Great Northern Goods Depôt, Farringdon-street, London, E.C.; Mr. John Jones, 40, Sydney-street, Chelsea, S.W.; Messrs. J. G. Kirtley and Co., St. Thomas-street Works, Sunderland; Messrs. John Phillips and Co., 17, Anderston-quay, Glasgow.

1109.—Cement-testing Machines: Makers of.—"G. R." writes:—"Would it be convenient for you to inform me (1) where I could procure a good cement-testing apparatus; and also (2) mention the best publication treating of cements, limes, &c.?"

Answer.—Manufacturers of cement-testing machines are (1) Messrs. George Salter and Co., West Bromwich, makers of Kuhlmann's improved cement-tester; and (2) Messrs. Bowes, Scott, and Western, Limited, London, makers of Faija's cement-testing plant; (3) Heath's "Manual of Lime and Cement; their Treatment and Use in Construction," price 6s.; Gillmore's "Practical Treatise on Limes, Hydraulic Cements, and Mortar," 11th edition, price 18s., may be recommended. There is also the important series of articles on "Limes, Cements, and Mortars: their Composition and Analyses," by Mr. W. J. Dibdin, F.I.C., now appearing in The Sanitary Record, and which is intended to be published separately, which should not be overlooked.

1110.—Proto-Sulphate of Iron for Precipitation of Sewage: How Obtainable.—"J. W. W." writes:—"I wish to ask you if you could give me the address of some firms where I can get proto-sulphate of iron? I have Mr. Dibdin's book on "The Purification of Sewage and Water," and he speaks so highly of it that I have to try it."

Answer.—Proto-sulphate of iron may be obtained for precipitation of sewage from Messrs. T. Herschell, Jones, and Co., Swansea. This firm are mineral importers and chemical merchants, and can be well recommended. The price of proto-sulphate of iron is about 30s. per ton delivered.

1111.—Sewer Construction: Storm Overflow.—"E. T." writes:—"(1) Will the Local Government Board sanction an improvement scheme for street, where sewer is shown only 5ft. below surface, and not below cellar floor of adjacent houses? (2) What is the limit of storm overflows for sewers sanctioned by the Local Government Board, and how are they calculated?"

Answer.—(1) Our correspondent should have explained more clearly what he intended to be conveyed by an improvement scheme. Is the sewer in existence at present, or only proposed? If the latter, the Local Government Board might require the Local Authority—if a representation were made to them by any of the adjacent owners at the Local Government inquiry as to the insufficiency of depth of the proposed new sewer to receive the drainage from their cellars—to lay the sewer at such a depth as would be adequate to receive cellar drainage. It is possible, however, that the sewer cannot be laid lower, so as to be connected to the sewerage system; and if this be the case, the Local Government Board would not enforce a departure from the plans. (2) We do not know of any fixed limit as to the height of sills for storm overflows, nor for the proportion which storm water must bear to the sewage before the storm overflow can be put into action; nor is it likely that such a limit will be fixed, as so much depends upon the impurity of the sewage and the standard of purity which must be attained as required by Rivers Conservancy Boards before it may be turned into streams. In some cases sewage is so weak that if it is diluted with rain water to four times its own bulk it would be safe to pass it; while in other cases it may require dilution to ten times its bulk.

1112.—Sewerage: Velocity of Sewage: Ventilation.—"E. G. T." writes:—"(1) In calculating the quantity of flow of sewage into a settling tank, would it be enough to take the last length nearest to the tank for the velocity and discharge in a sewer having varying gradients, or would the other different gradients have a bearing upon it? (2) In making a sewer which falls both ways from the highest part of a street, would it be right to make the ventilator act for both lengths of the same?"

Answer.—If the section of sewer nearest the settling tank be of some considerable length, the velocity and discharge must be calculated from this section, especially if it be of a less gradient than those sections above. Where, however, the last length is short, the velocity and discharge will be influenced by any greater gradients which may exist above it. (2) From the sketch submitted by our correspondent, it appears that the street wherein the proposed sewers are to be laid falls from the middle of its length in two directions, and that the sewers are intended to discharge at opposite ends of the street, but that they will be joined together at a manhole in the highest part of the street. If a ventilating shaft be connected to this manhole, the shaft will serve the purpose of ventilating both sections of sewers.

1113.—Ditches Alongside Public Highways: Cleansing of.—"E. H. B." writes:—"What legal right has a Highway Authority in any part of England to make the owners or tenants—farmers of adjoining lands—clean out the ditches by the side of the highways? I am aware that the theory is that the ditches belong to the owner or occupier of the land on the other side of the hedge; but this seems to me to apply to field hedges and ditches, which are, of course, to the interest of the occupier to clean out. In the case of roads the public benefit at the expense of the owner or tenant, and

it always appears to me that if either of them refused to clean out the ditch, there is no power to compel them."

Answer.—It has been laid down by the law officers of the Crown that "at common law a duty exists on the part of the owner of lands adjoining a highway to cleanse and scour his own ditches to such an extent as to prevent nuisances or obstruction to passengers, but that this duty can only be enforced by indictment. The general practice with Highway Authorities is to cleanse the ditches, as they are enabled to do under Sec. 67 of the Highway Act, 1835, and charge the cost on the highway rate. The effect of Sec. 67, as referred to, is to empower the Surveyor or Highway Board to cleanse ditches in a more effectual manner than landowners could be compelled to cleanse them.

1114.—Expanded Metal for Use in Concrete.—"A. T. B." writes:—"I beg to thank you for your reply to my query, No. 1105, on 'Concrete Bridges.' Would you please give me the address of a firm who make wrought iron wove netting, suitable for use with concrete structures, such as bridges, &c.?"

Answer.—For use with concrete floors, bridges, &c., the new expanded metal manufactured by the Expanded Metal Company, Limited, 39, Upper Thames-street, London, E.C., is difficult to be excelled. This material can be obtained in meshes varying from $\frac{3}{8}$in. to 6in. wide, and in thickness from 24 B.W.G. to $\frac{3}{16}$in. in steel, brass, or aluminium.

1115.—Cesspool Vans: Makers of.—"F." writes:—"Can you oblige by informing me of the name of the maker of a good type of tank cart, detachable force pump and stand, with hose, suction and delivery complete, suitable for the emptying of underground sewage tanks or cesspools?"

Answer.—Cesspool vans, for the removal of contents of cesspools, are manufactured by the following firms:—William Glover and Sons, Limited, Eagle Works, Warwick; Bristol Wagon and Carriage Works Company, Limited, Bristol; Woods and Co., Stowmarket, Suffolk; George Waller and Co., 165, Queen Victoria-street, London, E.C. The last-named firm make a speciality of pumps, and we can speak with confidence of their lift and force cesspool pump, mounted on wheels. Messrs. Glover and Sons are makers of the patent Radstock cesspool emptier, which is a cesspool van or cylinder designed to empty cesspools automatically, the principle of which is that the cylinder is filled by pneumatic agency. By means of a rotary air pump, worked by the rotation of the wheels when the van or cylinder is travelling, a vacuum is created in the cylinder; on arrival near the cesspool, the cylinder is connected by the suction pipe, and on a valve being opened the contents of the cesspool rush into the cylinder, when on being filled it is removed for emptying, the process being repeated on the next journey.

1116.—Sanitary Institute Examinations.—"J. W. D." writes:—"Would you be so kind as to tell me what Acts of Parliament, orders, and regulations I would require to get up to enable me to pass the examination of the Sanitary Institute, and where I could procure same?"

Answer.—Our correspondent should refer to our reply to Query 1034, in our issue of April 15th last, wherein we gave a list of books to be studied for the Inspectors' examination of the Sanitary Institute. We have previously advised, and continue to advise that candidates for these examinations will generally enhance their chances of success by studying under the guidance of an experienced "coach," several of whom advertise in our pages. Reid's "Practical Sanitation" (6s.) and Davies and Yabbicom's "Notes on the Factory and Workshop Acts," 4d., contain all the law necessary to be learnt by students.

1117.—Reduction of Salaries of Inspectors of Nuisances when off Duty through Sickness.—"L. S. D." writes:—"The Urban District Council of K— has recently adopted a resolution to pay their Sanitary Inspectors, who are appointed at a yearly salary, a very much reduced rate during sickness. There are no terms in their original engagements as to reduced salary during sickness, and they have hitherto received full pay when off duty through sickness. Can the Council legally stop part of the salaries under such circumstances? Please state any case bearing on the question. The resolution of the Council appointing the officer is in the following terms:—'Resolved that —— be, and is hereby appointed an assistant inspector at a salary of ——; that he devotes the whole of his time to the service of the Corporation, and that this appointment be terminable by one month's notice on either side.'"

Answer.—The power of Urban Authorities to appoint an Inspector of Nuisances and assistants is conferred by Sec. 189 of the Public Health Act, 1875. In the case of Inspectors, part of whose salaries is repayable by the County Council, under Sec. 243 of the Local Government Act, 1888, the appointment is subject to the approval of the Local Government Board. We are not informed whether the Inspector's appointment in the case put to us was subject to this approval. In any case, we are of opinion that the Local Authority cannot, in the appointment of an Inspector of Nuisances, make any deduction from his salary on account of illness, and he would be able to recover the amount of any deduction in any court of law. If the Inspector's appointment has been confirmed by the Local Government Board, we should advise him to communicate with that Board on the subject.

Contracts Open.

The dates given below are the latest up to which tenders can be received.

Bury St. Edmunds.—June 13th.—Plant.—Mr. F. Hastings Medhurst, B.Sc., M.I.E.E., consulting engineer to the Corporation, Westminster-chambers, 13, Victoria-street, S.W.

City Engineer (Cape Town, June 15th).—For the Corporation of the City of Cape Town. Commencing salary £800 per annum. Messrs. Davis and Soper, 54, St. Mary-axe, London, E.C.

Walton (Wakefield).—June 13th.—Sewering and Road-making.—Mr. William Watson, architect, Barstow-square, Wakefield.

Blackburn.—June 13th.—Reconstructing Privies, &c.—Mr. William Stubbs, A.M.I.C.E., borough and water engineer, Municipal-offices, Blackburn.

Rochdale.—June 15th.—Sewers.—Mr. S. S. Platt, M.I.C.E., borough surveyor, Town Hall.

Newark.—June 16th.—Lighting.—Mr. F. B. Foottit, secretary, Newark.

Poole.—June 16th.—Drain.—Mr. John Elford, borough surveyor, King-street, Poole.

Stonehaven (Scotland).—June 18th.—Sewer.—Mr. Murdoch, burgh surveyor, Stonehaven.

Totnes.—June 20th.—Sewage Works.—Mr. W. F. Tollitt, borough surveyor, Gate House, Totnes.

Hale (Cheshire).—June 21st.—Sewers.—Mr. J. M'D. M'Kenzie, 7, Market-street, Altrincham.

Southampton.—June 14th.—Sewerage Works.—Mr. W. B. G. Bennet, borough engineer.

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Vacancies.

BUILDING INSPECTOR (MERTHYR TYDFIL, June 13th).—For the Urban District Council. Salary, £2 2s. per week. Mr. John Vaughan, clerk, public offices, Merthyr.

CLERK OF WORKS (BERKHAMPSTEAD, June 16th).—For the Joint Committee for the Berkhampstead and Northchurch sewerage. Salary, £3 3s. per week. Mr. Samuel Stallon, clerk, Hemel Hempstead.

CLERK OF WORKS (ROCHESTER, June 15th).—Salary, £3 per week. City Surveyor, Rochester.

CLERK OF WORKS (ROTHERHAM, June 11th).—For the Board of Guardians. Salary, £3 per week. Mr. G. T. Barras, clerk, Rotherham.

CLERK OF WORKS (Surbiton, June 11th).—For the Urban District Council. Salary, £3 per week. Mr. Samuel Mather, A.M.I.C.E., district surveyor, Surbiton.

CLERK OF WORKS (WIMBLEDON, June 13th).—For the Urban District Council. The salary will be £3 3s. per week. Mr. W. H. Whitfield, clerk, Council Offices, Broadway, Wimbledon.

ENGINEER (LIVERPOOL, June 15th).—Mr. James Moulding, clerk, 15, High Park-street, Liverpool.

INSPECTOR OF WEIGHTS AND MEASURES (DEVONPORT, June 15th).—For the Town Council. Salary, £75 per annum. Mr. A. B. Pilling, town clerk, Devonport.

SANITARY INSPECTOR (LONDON, E.C., June 14th).—For the Corporation of London. Salary, £140 a year, with annual increments of £5 to a maximum of £200 per annum, with uniforms. Town Clerk, Public Health Department, Guildhall.

SURVEYOR (CONSETT, June 15th).—For the Urban District Council. Salary, £180 per annum. Mr. Thos. Wm. Welford, solicitor, clerk, Consett.

COMPETITIONS.

LINSDALE, July 1st.—Sewage Disposal and Water Supply. — The Linsdale Urban Council invite plans, specifications, with estimates for dealing with the sewage disposal and water supply for the above-named district, such plans and estimates to be sent to Mr. R. I. Platten, clerk, Linsdale, Leighton Buzzard, by July 1st, marked with a motto or *nom de plume*, and endorsed "Linsdale Sewerage and Water Supply."

FORMBY (LANCS), July 1st.—Sewerage Scheme.—The Formby Parochial Committee invite competitive schemes for the sewerage of a portion of the township of Formby. Premiums are offered amounting to £100 for the scheme considered first in order of merit, £50 for the second, and £25 for the third. Mr. J. H. Havelock Suttor, Piercefield-road, Formby. A professional assessor will be appointed to adjudicate upon the plans.

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THE

Sanitary Record,

JUNE 17, 1898.

Notes.

Legislative Prospects.

NOW that Parliament has once more resumed its labours, it is appropriate and fitting that we should make a brief forecast of what we may expect from the session that has just commenced. The Government are in the fortunate position of having already cleared off most of the larger measures which they placed in the forefront of their legislative programme; so that, with their enormous majority, there is no reason in the world why the larger number of their minor Bills should not be placed on the Statute Book before the prorogation. We are not sure, however, that we are entitled to make this assumption, from the outline which Mr. Balfour gave the House of Commons of the business with which he intends to proceed. A studious reticence was maintained on the subject of the Food and Drugs Adulteration Bill, and it is still uncertain what are the Government's intentions with regard to that measure. As to the Aliens' Bill, which affects so deeply the question of overcrowding in the East End of London, Mr. Balfour would give no assurance, as it is not a Government Bill. The Vaccination Bill and the Prisons Bill are, however, well advanced by this time, and we may reasonably look for their being passed into law.

The Dangers of the Match Trade.

THE Home Secretary was also subjected to an important series of questions arising out of the Bryant and May prosecution, which we noticed last week. The whole subject of the dangers incident to the use of phosphorus in the match trade is one for the serious consideration of the Home-office, and it is reassuring to know that Sir Matthew Ridley is fully alive to the necessity for an improvement in the law such as will prevent a repetition of the lamentable occurrences in Bryant and May's factory. We welcome with satisfaction his assurance that the responsibility for those occurrences in no way attaches to the certifying surgeon. The fatal neglect of duty lies at the door of the works doctor, and we expect that we shall hear soon of some further action—possibly penal—being taken with regard to his conduct. On the general question of the protection of the operatives in match factories, it is evident that we have something to learn from our continental neighbours regarding the restrictions in the use of phosphorus in the manufacture, and the Home-office has undertaken to inquire into the restrictions that are observed in France and elsewhere abroad. It would also appear that the danger of phosphorous poisoning may be obviated to a certain extent by the adoption of machinery capable of making lucifer matches without the close proximity of the workers, coupled with an improved system of ventilation. There is obviously a large field for inquiry, and the sooner it is undertaken the better. The special rules will have to be strengthened, and the medical supervision improved; and if these reforms are speedily effected, the Bryant and May case will not have been without its good results.

The Sale of Poisons.

A BILL, promoted by the Pharmaceutical Society, and having for its chief object an amendment of the constitution of the Society, is at present before Parliament; and an attempt has been made to make it the occasion for a removal of the restrictions on the sale of poisons. The desire for greater liberty was conceived in the interests of perfectly legitimate trade, and was no doubt very natural. Many manufacturers who supply farmers with insecticides or preparations for destroying vermin or disease in plants find the Pharmacy Acts a serious impediment. But we are glad that the House of Commons was in no mood to favour a relaxation of the law. We have just had, in the St. Neots murder case, a very glaring illustration of the dangers of laxity in the law relating to the sale of poisons; and sensible men are asking themselves, not whether the existing regulations should be relaxed, but whether they should not be made much more stringent.

Lead Poisoning in the Potteries.

As we anticipated in our recent remarks on this subject, the question of the appointment of Lady Inspectors for the Potteries district has been brought up in the House of Commons, and not only this question, but also the whole question of how the interests of the workers in the unhealthy and dangerous pottery industry may be most effectually safeguarded. Mr. Hedderwick asked the Home Secretary whether he would appoint a Lady Inspector for the protection of the workers, who are mostly women and children; and, further, whether he would altogether prohibit the use of lead in glazing processes in potteries, or bring such processes within the scope of the Workmen's Compensation Act. There were thus three distinct issues raised. As to the first of these, the Home Secretary contended that the existing staff of Lady Inspectors had done most useful work in the Potteries district, and he hoped would continue to do so in the future; and he even went so far as to express his cordial appreciation of the value of inspection by women in this industry, and to indicate that he was, in fact, considering the desirability of increasing the staff, though he would give no definite assurance on the point. That, it will be noted, is a considerable concession on his previous attitude, which it is gratifying to observe. The most urgent question, however, in the view of the Home-office, relates to the appointment of a Medical Inspector. It is at present under consideration, and upon the issue of that question will largely depend the decision of the department as to an increase in the number of Lady Inspectors.

A Promise of Reform.

THE second issue, as to the total prohibition of lead in glazing processes is one that Sir Matthew White Ridley declared he had no power to deal with. He can regulate and control dangerous processes by special rules under the Factory Acts, but the Acts do not extend this power to one of prohibition. The Home-office believes, however, that certain reforms in the direction of diminishing the use of dangerous glazes are practically possible. What these may be will entirely depend on the report to be made by the experts who have been appointed to inquire into the subject. Inquiries are also being made into the methods in vogue in foreign manufactures, which are expected to afford us additional light for our guidance. The third question raised by Mr. Hedderwick, involving the extension of the Workmen's Compensation Act to pottery employés, cannot be dealt with except by fresh legislation, which the Home Secretary says he is not in the meantime prepared to initiate. But if he is right in his belief that the new special rules will materially diminish the dangers to which the workpeople are exposed, we shall have much cause to be thankful for a greatly needed reform.

The Accumulation of Evidence.

ANOTHER fatality was reported in the Potteries last week. A young woman, aged 27, had to cease work some six months ago, and was laid up for five weeks. A few days since she resumed work, but soon complained of pains in the head. An epileptic fit followed, and, after terrible suffering, she died. At the inquest it was proved that the cause of all this agony was lead poisoning. On Monday last a letter appeared in the *Times* from Mr. Sydney Holland, the highly-esteemed chairman of the London Hospital. It appears that three victims have been removed from the Potteries to London in the hopes that something might be done for them. It is after a visit to these that Mr. Holland pens his letter. We can only give a few words:—"I have just left a poor woman sitting quietly and patiently, resigned to her terrible fate, blinded for life by lead poisoning. By her side sat another girl, nearly blinded by the same foul poison, but whose sight we hope to save. In another ward is a poor man suffering from epileptic fits due to the same cause, and the story they tell would simply not be believed if they did not bear on themselves the truth of their statement. I met a man visiting these poor patients, who has just returned from the Potteries, upon whose testimony I can rely. I will quote him and not them, lest it should be suspected that their evidence is prejudiced—little wonder if it was. He tells me that fourteen cases of blindness have lately come to light, some of them partial, but the majority total and incurable; that the lead poisoning is admitted by the authorities to be increasing, and that the cases reported from the Potteries number some hundreds every year; that the methods of production pursued in the Potteries are guided, not by science—there is not, he tells me, on the authority of a manufacturer, a single consulting chemist in the Potteries—but by rule of thumb." This latter statement is simply astounding, for such a thing is directly opposed to the employers' own interests. But the case for special Inspectors—male and female—is proved over and over again. Will the Home Secretary still hesitate to act?

The Exeter Sewage Scheme.

WE draw the special attention of our readers to the announcement made on another page to the effect that the Local Government Board has given its consent to the proposed sewerage scheme for Exeter. It is well known that the decision of the Board was awaited with some anxiety, for the scheme propounded possesses many features of novelty, which are regarded by some as purely experimental. This also appears to have been the feeling at headquarters, for the "approval" is given on the understanding that many "safeguards" are introduced in case of failure. We do not think any complaint can be made against such action; for there is no doubt several places have had to pay dearly for ill-advised experiments in days gone by. The engineer, Mr. Cameron, is very confident of success, and he claims that the results obtained on a small scale warrant his belief. The most notable feature, however, is the fact that the decision of the Board shows that it is fully alive to the advances made in the scientific treatment of sewage, and other districts will be encouraged to avail themselves of newer and better methods than those at present employed.

The Royal Institute of Public Health.

IN our issue of June 3rd we gave a brief outline of the arrangements made for the Annual Congress of this Institute, which opens in Dublin on August 18th. We are now able to give further details of

the suggested proceedings in the Sanitary Inspectors' section under the presidency of Mr. Conway Scott, C.E., Belfast. Inspectors and others are invited to contribute short papers for discussion upon the following important subjects: — (1) The relative responsibility of landlord and tenant for sanitary improvement and abatement of nuisances, and the amendment of the laws relating thereto. (2) Sewers and drains—amendment of laws relative to, &c. (3) Education and examination of candidates for the office of Sanitary Inspector. Practical papers bearing upon these subjects should elicit interesting critical discussion, and so draw out valuable suggestions. In consequence of the considerable advances made in sanitary legislation and the growing necessity for meeting the requirements of domestic and public hygiene, it becomes a matter of vital importance that sanitarians and all others interested in the welfare of public health should be afforded the opportunity of assembling and exchanging views and suggestions at meetings such as the above Congress affords. In addition to the papers to be read, and the discussions upon same, it is proposed that inspection shall be made of the principal buildings in connection with the Public Health Department of the Corporation and their workings explained to the delegates. Large public works and institutions throughout the city will also be visited. These inspections are additional to those previously announced.

Workmen's Compensation for Accident.

It will be well for Local Authorities to realise that we are on the eve of a complete revolution in the conditions of employment. The new Workmen's Compensation Act, which comes into force on the 1st of next month, is causing considerable anxiety among ordinary manufacturing firms, and preparations are being made for meeting the increased liability imposed upon them. But many of our public bodies do not appear to understand that they, too, are included within the scope of the Act, and that their responsibility is just as great as that of an ordinary employer. What the extent of that responsibility is, it is impossible to estimate. One who took a prominent part in framing the measure puts it at just about double what it would be under the old Employers' Liability Act, in other words, where an annual premium of £2 10s. was sufficient to secure them against loss, all that should now be necessary is one of £5 at the outside. But the insurance companies think otherwise, and we hear of premiums twenty times as large as those formerly demanded. Thus we have a wide divergence of opinion. One thing, however, is clear, it is extremely unwise for the various Councils to ignore the new *régime*. They should either establish a private fund, or effect insurances in some of the best offices. Anyhow, the matter is one of urgency, and should receive the attention of Councils and Vestries without delay.

The Itinerant's Ice Cream.

Something is likely to come from the action of the St. Olave's district in calling the attention of the Local Government Board to the dangers arising from the sale of "ice cream" by street vendors. The circumstance has been noted in a large number of metropolitan and provincial papers, and the *St. James's Gazette* sent forth a "special" to make inquiries. The Clerk of St. Saviour's was visited; Dr. Harris, the Medical Officer of Health for Islington, interviewed; and the report of Dr. Klein consulted, with the result that on Monday last our contemporary was able to issue the most telling contents bill of the day. We pass over the the details concerning "millions of microbes," or the analyses of Dr. Klein showing colonies of "billions of bacilli"—not "inferior to that obtained from sewage." We are afraid the boys of the street will not see the doctor's report, or, even if they did, they would but slightly realise the danger they run in consuming such concoctions as the itinerant vendor supplies. The most important point brought out by the special correspondent is Dr. Harris's remark that there is no standard for ice-cream, and none can say of what it should legally consist; and there is nothing in the Public Health Act whereby the sale can be prevented or the manufacture controlled. A short Bill in Parliament, however, might remedy this, and Local Authorities should be empowered to compel the registration of vendors, and make bye-laws regulating the conditions under which ices can be made and sold.

The National Health Society.

The large company assembled on Saturday last at Grosvenor House demonstrated the interest evinced in this Society. Very quietly it does its work, but the nation owes much of the improved hygienic condition to its operations during the twenty-one years the Duke of Westminster has presided over its fortunes. This fact was emphasised by Sir James Creighton when he stated that the gospel of cleanliness was being preached in all directions, in contradistinction to what was done fifty years ago. One notable effect is the marked decrease in consumption. In 1837 the proportionate death-rate was double what it is to-day; and one eminent authority has gone so far as to predict that thirty years hence this disease will be almost unknown. If this should prove correct, Sir James claimed that in no small degree would it be due to the efforts of the Society. The Princess Christian—ever ready to help a good cause—was present, and distributed diplomas, medals, and certificates to successful candidates.

Registration of Midwives.

The movement in favour of compulsory registration makes steady progress. At the annual meeting of the Association for securing this object, it was stated that as the result of letters sent out to the various coroners, asking permission to publish their names as being in favour of the objects of the Association, 153 out of 240 expressed themselves in accord with them, and only 15 were in any way opposed to the measure. People do not realise that almost any woman, however unskilled, can at present set up as midwife without being under the control of anyone, and that the only risk she runs is to receive censure from the coroner in any cases in which her inefficiency might have fatal consequences. Compulsory registration would alter this, and act as a "most salutary safeguard to the public."

THE CHEMICAL AND BIOLOGICAL ANALYSIS OF WATER.

By T. H. Pearmain and C. G. Moor, M.A. (Cantab).

Members of the Society of Public Analysts. Authors of "Applied Bacteriology," "The Analysis of Food and Drugs," &c.

(*Continued from page* 614.)

CHEMICAL EXAMINATION.

TOTAL SOLIDS.

The amount of solid matter left on the evaporation of a given quantity of water will naturally vary largely according to the geological character of the locality from which it has come. The "total solids" of a potable water consist mainly of calcium carbonate, sodium chloride, small quantities of nitrate, and sulphate of calcium, and a little silica, together with any non-volatile organic matters that may be present. The total solids in a good drinking water are generally not much above thirty grains per gallon.

If it is not desired to ascertain what the total solids consist of, but merely to learn their amount, it will be sufficient to work on 70 c.c., which should be evaporated in a platinum dish. The dish must be cleaned with pumice powder till quite bright outside and in, and the evaporation may be begun over a lamp, but must be finished over a water bath.

A temperature of 100 deg. Cent. is not sufficient to expel all moisture, and the dish should then be placed in an air bath and heated up to just 120 deg. Cent. for at least twenty minutes. It is then placed in a desiccator till just cold and weighed without delay. Not only do the "total solids" absorb moisture with great readiness, but the dish itself becomes heavier owing to the property possessed by platinum of occluding gases on its surface, so that a dish weighing 25 to 30 grammes may gain two milligrammes in standing in half an hour after heating. It is therefore essential that the dish should be weighed within a definite time, say, four minutes, after placing in the desiccator, whether it contain "total solids" or be weighed empty.

After the weight of the total solids has been obtained it is well to note carefully their behaviour when they are exposed to a very low red heat. If an appreciable quantity of organic matter is present when heat is applied, the solids will darken, and, on smelling, an odour of weeds or of burning animal matter may be perceived, according to whether vegetable or animal pollution is present, and in most polluted waters the smell produced is very distinctive. The temperature at which the ignition should be done is the lowest possible red heat, which must be continued just long enough to cause any darkening to give place to a white or grey, thus showing the complete combustion of the organic matter. By heating in this way we shall obviously expel carbonic acid from any carbonate of calcium that may be in the residue, and if the weight of the solids after ignition is subtracted from that of the total solids before ignition, the loss will be due to organic matter and to expelled carbonic acid. As it is our object to obtain as closely as possible the true weight of combustible matter, we replace the expelled carbonic acid by moistening every part of the residue with a strong solution of ammonium carbonate. After drying, the dish is very cautiously heated so as to expel all excess of ammonium carbonate, but not to causticise the calcium carbonate afresh. Although it is more than probable that the figures we obtain in this way are liable to considerable errors, the estimation is well worth making, for it will rarely happen that a good water, except possibly a peaty one, will yield a residue that will either darken or smell much on ignition, while there are very few bad waters that will not betray their character by the one or other indication. The "loss on ignition" in a water of good quality will seldom amount to more than 20 per cent. of the total solids. Generally speaking the total solids should not exceed 40 or 50 parts per 100,000, but, of course, much depends upon the constitution of the solids and upon the geological source of the water. Except in the case of waters from peaty sources, the slightest evidence of fumes, or darkening of the solids on ignition, will point to organic contamination.

ESTIMATION OF CHLORIDES.

Sodium chloride is a very constant constituent of urine, in which it is present to the extent of about 0·75 per cent., and hence is always to be found in waters that have suffered contamination from sewage or cesspool leakages.

The absence of chlorides in a water may be taken as good evidence of absence of sewage pollution, but the converse is, of course, not the case, as chlorides in water are also derived from the geological strata through which the water passes.

As chlorides are not readily removable from drinking water or sewage by any natural or artificial process, except, perhaps, by being drawn up by the roots of plants, it follows that when a water has suffered contamination with sewage matters the chlorides will remain as evidence, even after the organic matter that accompanied them has undergone natural purification and has disappeared.

Chlorine is usually estimated by titrating 70 c.c. of the sample, filtered, if necessary, with a standard solution of nitrate of silver. Decinormal solution of silver nitrate being rather too strong for convenience, it is customary to use a solution, so that every cubic centimetre of silver solution used up will indicate a grain of chlorine per gallon.

According to the equation,

$$AgNO_3 + Na\,Cl = AgCl' + NaNO_3,$$

and the molecular weight of silver nitrate being 170 and chlorine 35·5, one part of chlorine will be exactly precipitated by $\frac{170}{35·5}$ or 4·79 parts of silver nitrate, so that a solution, one cubic centimetre of which exactly precipitates a milligramme of chlorine, must contain 4·79 milligrammes of silver nitrate per cubic centimetre, or 4·79 grams per litre.

In preparing the solution nitrate of silver should be heated in the air-bath nearly up to the fusing point, and then 4·79 grammes weighed out quickly and dissolved in a litre of distilled water. The solution should be kept in a brown coloured bottle, or in the dark. The titration is performed in a white porcelain dish, and a drop of solution of potassium chromate is used as indicator. As soon as all the chlorides in the water have been converted into the silver salt any further addition of silver will cause the formation of silver chromate,

which is brick-red in colour, so that as soon as a perceptible colour is observable the titration is stopped, and the amount of silver solution used up is noted.

It is usual to deduct ·2 of a cubic centimetre for the amount of silver solution required to change the colour of the indicator.

W. G. Young has shown (*Analyst* 18, 125) that titrations to estimate chlorine should be performed always on cool solutions, as an increase of temperature even to 38 deg. Cent. (blood heat) gives results too high in consequence of the increased solubility of silver chromate with rise of temperature. He also shows that it is preferable to concentrate the solution to be titrated, and not to work with too dilute a solution of silver nitrate.

The amount of chlorine found in a water depends largely upon the nature of the soil through which the water has permeated. Surface waters and waters collected in the neighbourhood of the sea frequently contain very large quantities of salt, and in these cases the amount of chlorine found has but very little significance, but in cases where the geological strata contains but little chlorides, and where there are no manufacturing effluents to cause pollution, the amount of chlorides found is a very valuable guide to the approximate amount of sewage contamination present in the water. In several of the American States, particularly Massachusetts, the normal distribution of chlorine has been mapped out. This has been done by estimating the amount of chlorine in the unpolluted waters of the districts at a large number of points. When these points are joined by means of lines the normal distribution of chlorine at a particular point is easily found. These lines are known as *Isochlors*. From the chart so prepared of the "isochlors" in Massachusetts, the normal chlorine is found to vary from 0·45 grains per gallon near the coast, to less than 0·06 in the western part of the State ("Board of Health Report, 1892") These plans of the "isochlors" are exceedingly valuable, as when in a given spot an amount of chlorine is found in excess of the normal, it points to practically positive evidence of sewage pollution. It has been estimated by Thresh that each 100 persons per square mile add on the average 0·03 grains of chlorine per gallon to the water flowing from the area in consideration. From this data it is easy to calculate the approximate extent of the pollution. Unfortunately the plan of determination of the "isochlors" of districts, which is being so systematised in the United States, has but little application in small insular countries like England, although much valuable information might be gained by the systematic determination of the normal chlorine in the unpolluted waters of given areas. It should be noted that the value of the chlorine determination is largely detracted by the fact that the organic matter which originally accompanied the pollution may have become completely oxidised. Therefore it should be noted that the chlorine figure does not necessarily denote present pollution, although it may to a great extent be a measure of the past pollution, if it exceeds the normal chlorine figure of the district, which is due to geological conditions.

Generally speaking, unless it is accounted for by the geological conditions of the district, a greater amount than two parts per 100,000 should be regarded with suspicion.

HARDNESS OF WATER.

The hardness of water is generally due to the presence of salts of calcium and magnesium. It is measured by ascertaining how much of a standard soap solution is required to produce a lather lasting for two minutes with a certain volume of the water.

When a standard soap solution is run into a solution of a calcium salt till a lather is formed, in determining hardness in water, each equivalent of lime destroys an equivalent of soap. Put in an equational form in the case of calcium sulphate and sodium oleate,

$$CaSO_4 + 2NaC_{18}H_{33}O_2 = Ca(C_{18}H_{33}O_2)_2 + Na_2SO_4$$

A convenient quantity of water to take for the purpose is 70 c.c., and then if our soap solution contains just sufficient soap per cubic centimetre, to be exactly precipitated by a milligramme of chalk, it is clear that the number of cubic centimetres of soap precipitated by 70 c.c. of the sample of water will indicate the number of grains per gallon of chalk in the water, after allowance has been made for the amount of soap needed to produce a lather in pure water. It is clear that a certain amount of soap solution will be required to make a lather even in a water containing no hardness at all, and if the experiment be tried, using 70 c.c. of distilled water, it will be found that 1 c.c. of soap solution makes a lather lasting about two minutes. It is therefore customary to subtract 1 c.c. from the number of cubic centimetres of soap solution required to make a lather with distilled water. Soap solution is most easily prepared by dissolving 10 grammes of white Castile soap in fine shavings in methylated spirit. After warming, the soap will dissolve, but the solution will probably be cloudy, and must be filtered through filter paper. This solution has now to be tested against a water of known hardness, and, if too strong, some more spirit must be added, or, if too weak, some more soap. The soap solution will not keep at the same strength, but gradually becomes weaker, and it is therefore best to test it every time before it is used. For this purpose we require a solution of standard hardness, which is generally made by dissolving a gramme of Iceland spar—a pure form of calcium carbonate—in hydrochloric acid, evaporating to expel excess of hydrochloric acid, and making up to a litre with distilled water. Such a solution will then contain the equivalent of one milligramme of calcium carbonate in every cubic centimetre. We are obliged to dissolve the Iceland spar in an acid, because neither Iceland spar nor any other form of calcium carbonate is soluble to the extent of more than two grains per gallon. We have, therefore, to assume that the soap-destroying power of the calcium is the same when dissolved as calcium chloride, as it has in an ordinary drinking water, where it exists mainly in the form of calcium carbonate kept in solution by excess of carbonic acid gas. Supposing, then, that we are testing a fresh batch of soap solution, we should place the soap solution in a burette and take 10 c.c. of the solution of standard hardness, make it up to 70 c.c., and run in the soap, as in testing an ordinary water.

If the soap solution is just of the right strength a lather, lasting two minutes, should be produced by 11 c.c.

(To be continued).

THE MANCHESTER REPORT ON SYSTEMS OF SEWAGE PURIFICATION.

(Continued from page 590.)

SAMPLES of sewage and tank effluent were obtained by the Committee's Chemist, and the following is his report :—

Oldham Sewage Works,
January 12th.

Description of Samples.

The raw sewage contains grey suspended matter. It is chiefly of a domestic character. It occasionally contains a certain amount of cotton waste and oily matter from the cotton mills.

The tank effluent taken at 12 noon has a white opalescence ; is neutral to litmus.

The cinder filter sample has the same opalescent appearance, though to a less extent than the tank effluent. It is all neutral to litmus. It was taken shortly after noon.

Analytical Numbers

	Grains per Gallon.			
	Oxygen absorbed, four hours.	Free and saline ammonia.	Albuminoid ammonia.	Chlorine.
Raw sewage (shaken)	4·08	2·30	·70	—
Raw sewage (settled)	1·98	2·40	·38	4·5
Tank effluent	.98	1·10	·17	4·4
Effluent from cinder filter	·48	·85	·14	4·8

The chlorine figure shows the cinder filtrate to be from rather stronger sewage than the tank effluent. Reducing the two to a common chlorine standard, the albuminoid ammonia figure for the cinder filter becomes ·13.

Incubator Tests.—Three Minutes' Oxygen Absorption.

	Grains per Gallon. Before incubator.	After incubator.	Putrescibility.
Sewage (settled)	·58 ...	2·63 ...	Putrid in 2 days
Tank effluent ...	·36 ...	1·06 ...	Putrid in 2 days, goes quite black
Cinder filtrate...	·14 ...	·43 ...	Somewhat putrescent, but much better in appearance and smell than tank effluent

The Noton Shelf Filter.—This filter, which is the invention of Mr. Noton, consists of a framework supporting four lattice-work shelves, on which the filtering material is laid. The tank effluent flows over the top shelf, percolates through the filtering medium, and drips on to the next shelf, and so on to the bottom of the filter. There is 1ft. interspace between the bottom of one shelf and the surface of the filtering medium on the next. The bottoms of the shelves are constructed of laths set edgewise, with ½in. interspaces. On these the filtering medium is laid, consisting of a layer 1ft. deep of blue furnace cinders, broken down to pieces about 1½in. by ¾in. The clear area of each shelf is 6ft. by 4ft. The filter passes 5000 gallons in 24 hours, including periods of rest.

Samples were taken at the top and bottom of the Noton Shelf Filter. The analytical figures were as follows :—

	Grains per gallon.			
	Oxygen absorption, 4 hours.	Free and saline ammonia.	Albuminoid ammonia.	Chlorine.
Top of filter	·80	1·00	·16	4·3
Bottom of filter ...	·64	·98	·15	4·4

Incubator Test.—Three Minutes' Oxygen Absorption.

	Grains per gallon. Before incubator.	After incubator.	Putrescibility.
Top of filter ...	·30 ...	1·02 ...	Putrid in 2 days
Bottom of filter	·20 ...	·85 ...	do.

The above results appear to show that but little purification is effected by this filter.

Cascade Experiment.—Samples were also taken from the top and bottom of a set of wooden steps down which the effluent fell in a cascade. The analytical figures were as follows :—

	Grains per gallon.			
	Oxygen absorption, 4 hours.	Free and saline ammonia.	Albuminoid ammonia.	Chlorine.
Top of fall	·84	1·00	·16	4·4
Bottom of fall	·80	1·05	·16	4·3

Incubator Tests.—Three Minutes' Oxygen Absorption.

	Grains per gallon. Before incubator.	After incubator.	Putrescibility.
Top of fall ...	·32 ...	1·12 ...	Putrid in 2 days
Bottom of fall ...	·26 ...	1·00 ...	do.

From these results it will be seen that practically no effect is produced by aëration due to the cascade.

Nitrification.—Both the tank effluent and the cinder filtrate were tested for nitrites and nitrates practically without result. The tank effluent contained only ·013 nitrogen as nitrates, and the cinder filter ·016. No nitrites were found. Although the cinder filter effects considerable improvement in the effluent, yet the result, so far as it is reasonable to judge from an isolated sample, does not appear to be entirely satisfactory.

Supplementary samples from the Oldham Sewage Works.—Since the above report was written, a second visit was paid by the Chemist to the Oldham Sewage Works on the afternoon of February 11th. A second set of samples was obtained, and the analytical report on them is as follows :—

Description of sample.—The raw sewage sample was a mixture of samples taken at 4 a.m., 9 a.m., and 5 p.m. on February 11th. It contained a con-

siderable amount of fibrous suspended matter, which readily settled, leaving a fairly clear liquid, which was apparently diluted to some extent by the rain which had fallen during the earlier part of the day. The tank effluent sampled at 5 p.m. contained rather an excessive amount of brown suspended matter, probably owing to the increased speed of flow through the tanks, owing to rain. It was neutral to litmus. The cinder filtrate, sampled about 5.10 p.m., showed a slight white opalescence, as on the occasion of the Committee's visit. It was neutral to litmus.

	Analytical numbers (in grains per gallon.			
	Oxygen absorbed, 4 hours.	Free and saline ammonia.	Albuminoid ammonia.	Chlorine.
Raw sewage (shaken)	3·00	·70	·55	3·6
Raw sewage (settled)	·66	·70	·13	—
Tank effluent	1·82	1·15	·18	4·6
Cinder filtrate	·22	·55	·055	4·4

Incubator Tests.—Three Minutes' Oxygen.

	Absorption before incubator.	After incubator.	Putrescibility.
Raw sewage (settled) ...	·36	·28	Smells badly in 2 days
Tank effluent	·74	1·16	Black and putrescible in 2 days
Cinder filtrate	·16	·05	Remains sweet

Nitrification.—Nitrites were found to be present in the cinder filtrate, but not in the tank effluent. The total nitrogen as nitrites and nitrates was found to be as follows :—Tank effluent, ·04 ; cinder filtrate, ·25. The numbers show that under favourable circumstances some nitrification takes place. The chlorine numbers above given show that the tank effluent and cinder filtrate are fairly comparable. From the two sets of samples now examined it may, therefore, be concluded that the Oldham cinder filters give, on the whole, satisfactory results. Under occasional circumstances, as in the case with the filter at Davyhulme, a sample may be taken which is not absolutely non-putrefactive, but the amount of putrefactive change on incubation, even in such a case, is only small. The analyses of samples from other works described in this report show that nitrates are produced in greatest quantity by filtration when the sewage is largely of a domestic character. Oldham appears to be an exception to this rule ; the filters, however, have not been a very long time in use.

Chemical report. — The sewage here is much more of a domestic character than that of Manchester ; the precipitants are the same as used in Manchester, but the quantity is smaller, approximating to that in use at Barking. There is a distinctive feature in their mode of adding the lime, which there is no doubt gives greater efficiency for the quantity used over the method adopted in Manchester, and in fact at most other sewage works. The bulk of lime-water used is so great, being one-twentieth of the total sewage, that its adoption at our works would be somewhat difficult. The proportion of organic purification effected in the tanks is considerable, but the tank effluent is still decidedly putrescent. The filtration of this effluent through the cinder filters, however, practically removes this defect, and the resulting filtrate is on the whole satisfactory. We were informed that the effluent only remained one hour in these filters. In our opinion slower filtration and longer contact with the bacterial contents of the filters might be advisable.

Report as to cost and general working of filters.—One of the precipitating tanks at this place has been filled to a depth of 4ft. with clinkers and ashes as an experiment. The result was so satisfactory that the Town Council resolved on treating the whole of their effluent by biological filters, and three acres are now nearly complete. The most accurate details of cost were given, and the Mayor and the Engineer stated that it amounted to £700 per acre. This is for filters excavated to a depth of 3ft., and filled with clinkers to a depth of 28in., the sides being protected with 3in. deal plankings ; they are constructed on a natural retentive clay bottom, puddled where necessary. These appear to be the least costly filters we have seen. It is stated that these filters if charged more frequently are capable of passing over a million gallons per acre during the 24 hours.

(*To be continued.*)

Institute of Sanitary Engineers

INCORPORATED

OFFICIAL TRANSACTIONS.

THE following members have recently been elected :—

Fellows.—Chas. Abburrow, Johannesburg ; S. J. Adams, Southend-on-Sea ; J. R. Brooks, Wimbledon ; Marshall Hainsworth, Teddington ; Harold Harlock, Southend-on-Sea ; E. J. Jones, Cardiff ; J. C. Leed, Cambridge ; Hugh McLean, Nottingham ; J. N. Matthews, Doncaster ; A. Morris, St. Boswells, N.B. ; F. S. Rayner, Newhaven ; J. F. Stow, Bridlington ; W. T. Unwin, March.

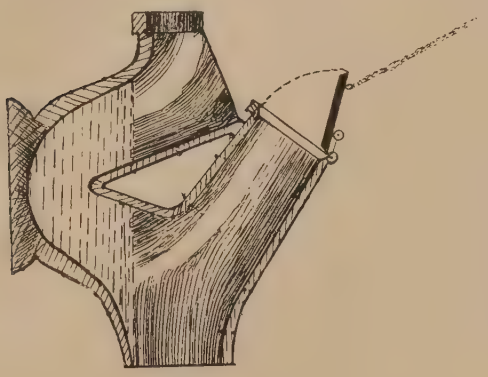
Associates.—J. H. Bridge, West Bromwich ; C. E. Butcher, London ; W. H. Chown, Lympstone, Devon ; J. S. Coverley, Penmaenmawr ; J. Davies, Carmarthen ; C. E. Getting, Sydney, N.S.W. ; H. L. Jacques, Manchester ; H. G. Mankin, London ; W. J. Mansfield, Nottingham ; W. E. Markham, London ; W. R. Nicoll, Perth ; Geo. Nuttall, Haslingden ; E. Streather, Deptford ; Wilmer Sturch, London ; J. T. Webb, Sutton ; E. Wade Wilton, Batley, Yorks.

Any of our readers desiring information concerning the Institute should communicate with the Secretary, 63, Chancery-lane, W.C.

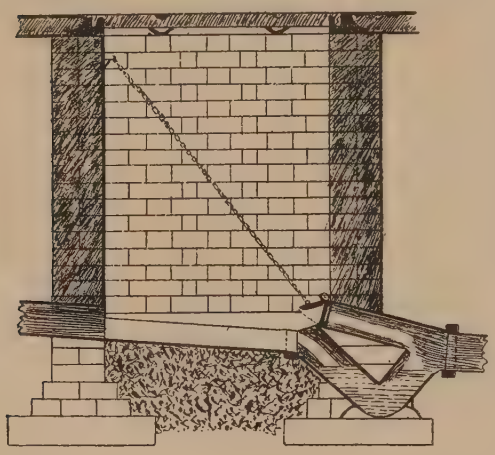
NOTICE.—The Annual Subscription to this Journal has been raised to 12s. 6d. to all NEW Subscribers. NO ADVANCE will be made to our friends whose names were entered on our Subscription list prior to March 31st, so long as they continue to subscribe.

A NEW PATENT INTERCEPTING TRAP.

We have much pleasure in introducing to the notice of our readers a new patent intercepting trap, the invention of Mr. Arthur A. Grist, Sanitary Inspector for the Board of Works for the district of St. Saviour's. The invention consists of a device by



means of which the stopper of the sweeping arm of intercepting drain traps is hinged, which not only prevents its being blown out and blocking the drain, but should it become choked from any other cause, and the inspection chamber and drains fill with sewage, it can be readily opened by means of the chain attached to it, the end of which is fixed to the



brickwork of chamber near the surface, and the sewage let off through the sweeping arm, or if the drain is choked beyond the trap, the rods can be inserted and the stoppage cleared, thus saving the very objectionable method of baling out the sewage before the stopper of the intercepter now generally in use can be taken out. This should commend itself not only on account of its great simplicity and utility, but also because it can be attached to existing traps by cementing a short length or collar with fitted hinged stopper into the sweeping arm of almost every description of intercepter at a very small outlay. It will, without doubt, be largely recommended and adopted, not only by Sanitary Authorities and Inspectors, but by sanitary engineers and the trade generally, as soon as it is placed upon the market, as it supplies a long-felt want in this direction.

THE LOCAL GOVERNMENT BOARD AND THE EXETER SEWAGE SCHEME.

THE SYSTEM SANCTIONED.

The Local Government Board have, we understand, decided to give their approval to the scheme submitted to the Exeter City Council by Mr. Cameron, the city surveyor, for disposing of the sewage of the city, and will authorise the raising of the loan required for this purpose, the amount being estimated at about £40,000. Under Mr. Cameron's scheme the whole of the sewage of the city will be carried by four intercepting sewers to the Council's property at Belle Isle and Eveleighs, where it will pass into septic tanks and become the subject of bacterial treatment. The effluent will be disposed of by filtration over land at Duck's Marsh.

Experiments have been carried on by the City Surveyor for just two years. An inquiry into the system was held a short time since by Inspectors from the Local Government Board, and it was attended by representatives of Sanitary Authorities in all parts of the kingdom. The evidence was very complete, and seemed to leave no room for doubt as to the efficacy of the system suggested by Mr. Cameron. The Local Government Board have followed up the public inquiry by careful examination on their own account, and by acquiring further information on various points as they, on consideration, presented themselves to their minds.

The Board have directed their inquiries with the view of determining two questions. In the first place, they desired to ascertain whether the final effluent obtained by the septic process was uniformly of such a character as to permit of its discharge into the river without further treatment on land. If not, was the process a sufficient preliminary to the treatment of the sewage on land, and was the land possessed by the Council suitable in quality and quantity?

We understand that the Local Government Board have come to the conclusion that if the septic process be adopted, a further treatment of the sewage on land would still be required previous to the effluent being discharged into the river. The Board are not, however, unwilling to accept, by way of experiment, the adoption of the process recommended by the City Surveyor as a method of treatment preliminary to further treatment on land. The Local Government Board will approve of the scheme on the distinct understanding that the City Council, in adopting this system as an experimental substitute for the ordinary process of chemical precipitation, will accept the entire responsibility for the experiment and will give an undertaking that, in the event of the process failing to give satisfactory results when applied to the sewage of the entire city, they will adopt in its place some process of treating the sewage with chemicals combined with artificial filtration. The Board mention, in this connection, that they understand that the tanks

can readily be made available for use as part of such a system.

With regard to the quantity of land required, the Local Government Board assent to the scheme of the Council possessing themselves of land for treating the effluent equal to that which is required under schemes in which chemical precipitation and artificial filtration are adopted—that is to say, an acre for each 2000 of the population. The Council have now in their possession, attached to the site of the works, close upon this quantity. The Local Government Board point out that they have further land at Countess Weir, some portion of which land they might probably exchange for the further quantity they will require adjoining Duck's Marsh, and which land is quite suitable for the purposes of filtration.

The Local Government Board will require the Council to protect themselves from floods, and will, therefore, stipulate for flood banks at Duck's Marsh and Belle Isle. Although the construction of these flood banks was not originally contemplated by Mr. Cameron, still this work will not be of a very serious character, inasmuch as the excavations necessary for forming the tanks will provide most of the material necessary for making the flood banks, and, indeed, will save it being carried elsewhere for disposal. The Board also deem it right to stipulate that the works shall be strengthened at certain points, their evident desire being that everything possible shall be done to minimise the chances of failure from any cause whatever.

MUNICIPAL ENGINEERS AT NORWICH AND YARMOUTH.

THE Eastern Counties district meeting of the Incorporated Association of Municipal Engineers was held at Norwich on Friday last. The members were welcomed by the Mayor (Mr. C. C. Rix Spelman) and other members of the Corporation. The chair at the Engineers' meeting was occupied by Mr. J. S. Eayrs (past president). A paper, describing some of the chief features of Norwich and the municipal engineering works in progress, was read by Mr. A. E. Collins, the City Engineer. The population of the town, it appears, is 112,000, and the area of the city 7472 acres. The rateable value is £346,553, which is regarded as extremely low, having regard to the population and area, the result being that the rates in the £ were high, being over 8s. in the £. Some portions of the drainage system still in use were centuries old, and during the past few years considerable lengths of ancient sewers had been put out of use, these being built with walls and flat bottoms. In consequence of the earlier works of sewerage being constructed so as to discharge into the river, a serious nuisance was caused, which necessitated the construction of a new main intercepting sewer, and the provision of a sewage farm of 503 acres, 268 acres of which being available to receive sewage, the mode of treatment being broad irrigation, the effluent discharging into a tidal stream. Soon after the main outfall sewer was brought into use it was found that it admitted subsoil water to an extraordinary amount, necessitating great cost in pumping to the farm. As the result, it was advised that (1) the construction of a new main outfall sewer at a higher level than the old one be constructed, and that the old one be abandoned; (2) the adoption of the Shone system for raising the sewage of the low-level districts into the new main outfall sewer; (3) the re-drainage of the whole of the city on the separate system. This work has been in progress for a considerable period, and is still proceeding. The larger sewers are constructed in concrete pipes backed with cement concrete, the smaller-sized sewers being formed with stoneware pipes, jointed with the Hassell and Parker joint.

For the construction of the sewers across the river at five points, comprising nine actual pipe crossings, various methods were adopted as circumstances dictated. At Carrow Bridge, where the river is crossed by a 12in. sealed main, a 7in. low-level gravitating sewer, and a 3in. air main, advantage was taken of the old low-level branch sewer 30in. in diameter to receive the three new pipes. The old sewer was too small to admit of the jointing of pipes within it; moreover, it was neither straight, horizontally, nor vertically. At Foundry Bridge advantage was taken of the existence of the old low-level sewer crossing, which consisted of an iron pipe 6ft. internal diameter. The size available made constructional work comparatively straightforward at this point. At Fye Bridge a 24in. sealed main, inclining from north to south, and a 9in. gravitating sewage sewer from south to north, had to be constructed beneath the bridge and below the navigation depth of the river. This work had to be done without stopping the bridge for traffic or the river for navigation excepting during a limited number of hours, and was effected as follows:—Steel pipes 30ft. long (the span of the bridge being 33ft.) were obtained; at both ends of this pair of pipes wooden yoke pieces were attached in such a manner as to secure the pipes in their proper relative positions to each other; the joints between the yoke pieces and the pipes were caulked so as to be water-tight, the sides of the yokes were grooved to receive the sheeting planks of a cofferdam, and to their tops doors were hinged; such doors afterwards formed parts of the cofferdams. The pipes having been prepared in this manner, they were floated upon a pontoon beneath the bridge, and slung from the bridge by means of proper tackle above a trench which had previously been dredged to receive them. The pontoon was then floated away, and the pipes lowered on to the dredged bed. Up to this time the doors above mentioned were lying horizontally upon the pipes, this being necessitated by the limited head-room beneath the bridge. When the pipes had been lowered the doors were raised to the vertical position, the position of the pipes accurately adjusted by the aid of marks previously placed upon the doors, and the pipes covered with concrete. Cofferdams were then driven in continuation of the small portions of such dams formed by the doors and yokes. The driving of the piles had to be effected to a great extent by means of hydraulic jacks, which abutted against the underside of the bridge. Shafts were then sunk at the landward end of both abutments and headings driven beneath the abutments into the cofferdams. This work had to be carried out at such a depth as to be in parts below the points of the piles supporting the bridge abutments. A manhole was built at each end of the river length. Through these manholes the pipes are carried in special castings provided with large access doors to enable blockages to be dealt with should they occur. Blow outs and stop valves are also arranged on the up-stream

side of each of the deepest dips to enable the pipes to be to a great extent emptied without pumping. These precautions were taken with the whole of the inverted syphons excepting that from No. 5 ejector near New Mills, where the dip is comparatively slight. The difficulties arising from the attempt to carry out the separate system in this ancient and irregularly built city were found to be so great and likely to lead to such an enormous outlay that the author, soon after his appointment, advised that, except in the low-level districts drained by means of ejectors and in new buildings and new building estates, the separate system be not proceeded with for the time being, but that the then existing combined sewers be intercepted at suitable points in such a manner that sewage and storm water up to a sufficient dilution should pass into the sewerage system, and after the pre-arranged amount of dilution had been exceeded the whole flow should pass to the river, which where any of the storm overflows exist is tidal, and below the New Mills Weir, which in its turn is some distance below any waterworks intake. The Council accepted this proposition, and since that time the works have proceeded on the lines recommended. Whilst the author upholds the separate system of sewage as the best one extant, yet the complications and expense are so great in cases similar to that which he is dealing with in Norwich, that he feels he is perfectly justified in the departure from it he has made.

For the drainage of the districts lying below the levels commanded by the new main outfall sewer six ejector stations have been constructed, each containing a pair of Shone's ejectors, manufactured by Messrs. Hughes and Lancaster. The pair of ejectors at station No. 5, near the New Mills, are the largest yet constructed, and are notable as having double inlet and outlet pipes and valves to facilitate filling and discharging. This pair of ejectors have lifted 1000 gallons per minute against a head of 14ft. 8in. through an 8in. rising main, 375 yards long, discharging into the main outfall sewer in St. Benedict's-street. The whole of the ejector stations are for the greater part of their depths below the line of saturation. Large volumes of water had to be dealt with in sinking them; in two cases pumping was of no avail, and air pressure had to be used during the excavations. Air under a nominal pressure of 15 lb. to the inch is distributed to the six ejector stations from the power station at New Mills, through 2⅞ miles of cast iron pipes, having a maximum diameter of 9in. and a minimum of 3in. As the pipes were laid, and again after completion, they were tested with air pressure at 40 lb. to the inch, and were not accepted unless the losses from all causes amounted to less than 5 per cent. of the absolute initial test pressure in one hour.

Mr. Collins then went on with considerable detail to describe the air-compressing machinery. The method adopted for raising the refuse is special, and was due to the fact that sufficient space was not available for the construction of an inclined road to the top of furnace setting, which is higher than usual above ground level because of the liability of the site to floods and the desire to keep the flues, &c., dry. The method in question is as follows:—A sunk rail pit has been constructed in such a manner as to enable the house scavenging vans to tip their contents into trucks running on rails in the rail pit. The trucks are each of equal capacity to that of a van. When refuse is required for the furnaces an overhead rope-driven traveller, which commands the rail pit and the furnace top, raises the body only of a truck, travels with it to the charging hole of a furnace, where the truck bottom is opened and the refuse is deposited; the empty truck is then returned by the traveller to its wheels. A sufficient length of rails has been provided to accommodate twelve trucks, and storage for additional truck bodies is being provided at the level of the furnace top. The six trucks included in the experimental delivery do not give quite satisfactory results, as in consequence of the local practice of collecting every class of refuse, a large amount of fibrous material such as straw, &c., has to be dealt with which does not fall through the openings in the truck bottoms freely. It is intended to adopt a different arrangement for the remainder of the trucks and to alter the six experimental ones. The new trucks will be provided with trunnions to enable them to be tipped, and thus emptied. The flow of the river Wensum, which has an average fall of 6ft. 6in. at New Mills, offers an alternative to the steam plant for actuating the air compressors. The old-fashioned small sluices which formerly existed at New Mills caused river floods to be greater than they should have been, due to a great extent to the tendency they had to become blocked with *débris* brought down by the river. In constructing the new works, advantage has been taken of the late Mr. Stoney's invention, and a sluice on his principle, 14ft. 3in. wide by 8ft. deep, has been provided. This sluice was supplied by Messrs. Ransome and Rapier, of Ipswich. It can be raised or lowered with the full head of water against it by one man. Mr. Collins concluded his interesting paper with a description of the Free Library and Baths.

A ROUND OF VISITS.

The rest of the afternoon was spent in a round of visits of inspection. A time table had been drawn up by Mr. Collins with such good effect that the visitors, who were conveyed rapidly from point to point in pair-horsed wagonettes, were able to see not only the principal engineering features of the city, but two or three places of general interest. They first rode down to St. Andrew's Hall in order to see how the pneumatic painting machine does its work. The lightning painter, one of Messrs. Wallwork and Well's patent, is so new an invention that though Norwich is not exactly the first of the provincial towns in which it has been employed, most of the visitors had to confess that they had had no previous experience of it. Undoubtedly it represents an enormous advance upon the old system of painting by brush, and particularly so in cases where there are large wall spaces to be covered.

Some twenty minutes having been occupied in seeing how the machine adapted itself to stencilling and other tests demanded of it, the party proceeded to the New Mills air-compressing station. Here machinery has been erected for lifting the sewage to higher levels, in accordance with the principles of the Shone system, the power being transmitted through cast iron air mains to the various ejector stations in the streets.

After luncheon a visit was paid to Carrow Works, which came not strictly within the sphere of muni-

cipal engineering. But at Carrow there is so much of mechanical interest to be seen that Mr. Collins, knowing that his party could not go away without visiting the adjacent pumping station, undoubtedly did well to procure admission to a few of the departments. The party next inspected the Trowse Drain Outfall Sewerage Station, where by means of extremely powerful machinery the sewage is pumped up to the sewage farm. From thence they drove to the Castle Museum, where Mr. Collins conducted the party to the battlements and showed them the principal objects in the panorama lying around about.

In the evening the members of the Association dined together at the Maid's Head Hotel. Mr. Eayrs again presided, and there were about sixty-five members present.

NATIONAL HEALTH SOCIETY.

HER Royal Highness Princess Christian, attended by Colonel Martin and Miss Emily Loch, on Saturday presented the diplomas, medals, and certificates gained by the successful candidates at the various classes and examinations held during the past year by the National Health Society. The ceremony took place at Grosvenor House, by permission of the Duke of Westminster, who, as president of the Society, occupied the chair. There was a large attendance of ladies and gentlemen.

The DUKE OF WESTMINSTER, in opening the proceedings, said that he had been twenty-one years president of the Society, and nothing could be more satisfactory than the extraordinary and increasing success which had attended its operations. The number of certificates to be presented was less this year than last, but this was only because of the large growth of the work in the country districts. Examinations were now held at centres so far removed from town that it was not possible for the successful candidates to be present. Lectures and examinations were now, in fact, held all over Great Britain and Ireland. The Society now examined classes and granted certificates to the quarter-masters of the regiments stationed at Aldershot, the Duke of Connaught having ordered that they should have instruction in hygiene and sanitation. This knowledge would be of the greatest possible value to them in their Army work. The Society had to deplore the loss of Mr. Ernest Hart, the chairman of the Committee, who had done excellent work for many years. His place had been worthily filled by the Rev. C. J. Ridgeway.

Princess Christian then presented the awards, and this was followed by an address by Sir A. ARNOLD, who, referring to the death of Sir Robert Rawlinson, said that event could not fail to raise thoughts of the great improvement in our national health which had taken place during the last half-century. The humblest dwelling in Whitechapel was to-day in a better sanitary condition than were then the residences of the most distinguished and august people in the land. That being so, to what might we not look forward in the future? There could, however, be no satisfactory reform without instruction, which the Society gave, and therefore its work deserved the heartiest support at the hands of all classes of her Majesty's subjects.

The Rev. C. J. RIDGEWAY moved a vote of thanks to her Royal Highness, and

Sir J. CRICHTON-BROWNE, in seconding, mentioned that during her Majesty's reign the deaths from tubercular diseases had decreased two-thirds. This exactly corresponded with the advance in sanitary science.

The resolution having been carried amid loud cheers, Princess Christian bowed her acknowledgments, and the proceedings were closed with a vote of thanks to the Duke and Duchess of Westminster.

CONSUMPTION: SUGGESTION TO SANITARY AUTHORITIES.

AS a means of spreading information upon this important subject, Sanitary Authorities could undoubtedly accomplish much towards the prevention of consumption by issuing a circular like the following :—

THE PREVENTION OF CONSUMPTION.

Instructions to Consumptives and their Friends.—Consumption is a dangerous communicable disease. One consumptive may spread the disease to very many healthy persons. The chief danger exists in the expectoration of the consumptive person, and if this expectoration is carefully destroyed before it is dried, little danger need be feared.

Consumptives should be instructed not to spit upon sidewalks, the floors of rooms, public halls, street and railway carriages, and other vehicles, or anywhere that the sputum may become dry, for in the dried state the wind, trailing skirts, the act of sweeping, &c., diffuse the germs, so that they may be readily inhaled and swallowed ; nor should they spit where fowls or dairy cows may take in the sputum, or the dust of it with their food. They should spit into pieces of cloth, or receptacles made for the purpose, containing a saturated solution of carbolic acid (one part of carbolic acid crystals to about fifteen parts of water). Such pieces of cloth should be destroyed by fire, before the sputa become dry, and other receptacles should be cleansed with scalding water, their contents having been destroyed or otherwise carefully disposed of. Handkerchiefs which may have been used from necessity should be boiled half an hour before washing.

A healthy person should not sleep in a room with a consumptive.

Remember that sputa must never be allowed to become dry.

A circular on the "Restriction and Prevention of Consumption" will be forwarded to any person upon application.

HAMPTON.—The County Analyst for Surrey has made an examination of two samples, taken from the sewers at the manhole in Lower Teddington-road. He reports that one sample had a very "tarry" smell, and light oil floated on the surface. This pointed to the presence of mineral matter far higher than in ordinary sewage. The inference drawn from this report is, that the gasworks of the neighbourhood are discharging refuse into the drains. A notice is to be served on the gas company to discontinue the practice.

Annotations from Annual Reports.

Scarlet Fever and Dairy Supplies.—The following extract from the report of the Medical Officer of Health for the Borough of Halifax affords a striking instance of how disease may be spread through negligence on the part of those responsible for milk supplies:—"On Saturday, the 19th June, eight cases of scarlet fever were notified to the Health Department, and five more on the following Monday, the 21st. As this was an unusual number for us to receive in two days, especially from one district, viz., Saville Park, Inspector Archbell received instructions on the Monday morning to visit the address of every notified case, and ascertain the milk supply in each case. In less than two hours we had the information that every one of the reported cases received milk from one or the other of two purveyors, Mr. Valentine and Mr. Fell, the latter being only a dealer, living in the immediate neighbourhood. The Inspector called upon him first and satisfied himself that there was no cause of suspicion in Mr. Fell's house. Inquiring of Mr. Fell as to his milk supply, the Inspector was informed that he received about five gallons a day from a Mr. Valentine, a farmer, living about a mile on the west side of the town, and a larger quantity also from a farmer in Warley. The Inspector then visited the latter place, and could find no trace of scarlet fever there. He then went to the farm of Mr. Valentine, and found evidence of scarlet fever in several members of the family, who had been or were ill, without any medical attendant. All this was reported to me at noon of the same day, and, accompanied by the Chief Inspector, I went at once to the farm and found a boy, aged thirteen, fresh in the fever, had a good rash out and sore throat, &c., and going freely about the premises, in and amongst the cows. Mr. Valentine himself was in bed with a sore throat, and Mrs. Valentine showed some signs of desquamation, although she stoutly denied having been ill. Besides the above there was an elder son aged nineteen, who took the milk to the town, and a farmer's man, who did the milking and other work on the farm; the latter had not complained of anything, but the elder son had had a very sore throat, and still kept to his work. Here, of course, was the source of all the mischief."

Law Cases.

THE POLLUTION OF RIVERS.

THE case of West Riding of Yorkshire Rivers Board *v.* Goldthorpe and Another was heard last week in the High Court (Queen's Bench Division), before Mr. Justice Day and Mr. Justice Lawrance, under a special Act of Parliament (the West Riding, Yorkshire, Rivers Act, 57 and 58 Vict., cap. 166) by way of appeal from the Quarter Sessions of the West Riding of Yorkshire at Leeds. The case had been argued before another Divisional Court last sittings, but that Court had been of opinion that the facts should be considered as well as the law, and eft the matter open.

Mr. Tindal Atkinson, Q.C., Mr. Longstaffe, and Mr. Roskill had appeared for the appellants: Mr. Cripps, Q.C., Mr. T. R. D. Wright, and Mr. T. Ellison for the respondents.

The appellants were the River Board; the respondents were corn mill owners on the river Don. The question was whether the respondents had committed an offence under Sec. 5 of the Act, which prohibited the deposit of mud, sludge, or solid matter in a river. The process of the respondents was to collect in the mill dam the water that worked the mill, by reason of which a deposit was created. Periodically this deposit was shovelled out into the stream and allowed to be washed down. Evidence was given that as much as 300 tons in one day was thus sent down, and a sample of dark-coloured water was put in evidence. There is a proviso in the Act that no person should be deemed to have committed an offence for putting or permitting to be carried into any such river any sand, gravel, or natural deposit which should have flown in or been deposited by the current of any such river or stream, provided that the sand, gravel, or other natural deposit so put back or carried as aforesaid did not interfere with the due flow of or pollute the water of such river. The justices and the Quarter Sessions had refused to convict on proceedings taken under the Act.

The Court dismissed the appeal.

Mr. JUSTICE DAY said he concurred with the decision of the Petty Sessions and the Quarter Sessions, which was a Court very largely attended by justices who knew the locality and the river in question. The proceedings were taken under an Act entitled "An Act to make more effectual provision for preventing the pollution of the rivers of the West Riding of Yorkshire and their tributaries." He had a bias in favour of such an Act, for the pollution of rivers in the teeming populations of the day was deserving of condign punishment. But this was not a case for a prosecution. The respondents were people who kept a flour mill—one of the most ancient industries in the country. This was a rural flour mill, the first mill on the Don. There were many others lower down on the same river, and there were also manufactures below in towns. Grinding corn was not a pollution of either air or water. In a certain sense, however, the respondents had caused an influx of solid matter into the river. His Lordship read the preamble referring to the "polluted and filthy condition" of the rivers and Sec. 5 of the Act. Commenting on the latter, he said that general words must be treated as associated with the other special words of the section. A rural mill for grinding corn was not the same class of thing as the manufactures or other matters mentioned in the Section. The Act was meant to prohibit the putting into the river the dirt, &c., that came from manufactures such as one met with in towns. He did not see that in this case anything more was put into the river than the river itself brought down, which was an exception within the Act under Sec. 6 (3). In his opinion, Sec. 5 did not apply to "the cleaning out" a natural deposit of a mill dam. That was a natural deposit ordinarily associated with a mill pond when the water was torpid for a certain time. This was not an offence under Sec. 5, and, if it were, it would come within the exception.

Mr. JUSTICE LAWRANCE concurred. The main object of the Act was to prevent the pollution of

rivers. There must be either pollution or interference with the clear flow of the stream. There was no evidence of pollution in the proper sense of the word in this case. What was done was that the mud was periodically stirred up and sent down the stream. It was mud that was naturally found in the river. The magistrates below were quite right.

General News.

CHATHAM.—It is stated that measles has broken out in this town, and that the Medical Officer has ordered the closing of all schools.

BIRMINGHAM.—It is announced that Messrs. Morrison and Mason, of Glasgow, have secured the contract for the water supply extension for Birmingham. The contract price is half a million sterling.

SOUTHWARK.—Another open space has been secured in this populous district. The Vestry and the London County Council have purchased a plot of ground from Lord Llangattock, the contribution of the former amounting to £3400.

LONDON.—A letter has been received by the Vestry of St. Luke's from the Burgomaster, stating that the City of Cologne had resolved to get rid of its refuse by burning. A deputation was about to travel to England in order to inspect the arrangements made by the various towns in which destructors were employed, and asking permission to inspect the destructor of the parish.

SEVENOAKS. — The Medical Officer of Health has made an analysis of the water supply for the Urban District Council. From his chemical examination in May he found the sample to be an excellent water for drinking and domestic purposes, whilst from bacteriological examination, in which Dr. Tew made a special search for the typhoid and coli bacilli, the result was entirely negative—from a bacteriological point of view the water was pure and uncontaminated.

HAMPTON COURT.—Another interesting discovery has been made in the course of the excavations for the effluent pipe of the new Thames Valley drainage, along the towing path of the Palace Gardens at Hampton Court. Last Friday, between the railings of the private gardens opposite the end of Queen Mary's Bower, the foundation of the old water gate, or "water gallery," built by Henry VIII., was cut through. The walls or piers were found to be of immense thickness, not less than 25ft. wide, and constructed of the hardest chalk faced with stone. It is said that the opening through which the State barges once passed is clearly discernible.

CAMBORNE.—The official report of Dr. R. Bruce Low, one of the Medical Inspectors of the Local Government Board, on the outbreak of typhoid fever in the urban district of Camborne, and in portions of the adjoining rural districts of Redruth and Helston, has just been sent to the members of the Councils affected. The outbreak occurred during December and January last, and was reported to the Local Government Board on December 15th by Dr. Telfer Thomas, Medical Officer of Camborne, and subsequently by Dr. A. E. Permewan, of Redruth, and Dr. N. H. Haswell, of Helston. The report concludes:—"The sanitary condition of Camborne and Illogan, as well as of parts of Crowan, is far from being satisfactory." The appendices include the recommendations of Dr. Reece in 1894, which are referred to in the report. Those deal with the water supply, isolation provision, excrement and refuse disposal, insanitary dwellings, and the provision of houses for the working classes, and overcrowding of persons in houses.

ABERDEEN.—Three new wings are to be added to the City Hospital, according to designs by Mr. John Rust, city architect, at a cost of £4650.

ROTHERHITHE.—At its last meeting the Vestry accepted the tender of Messrs. Henry Knight and Son, of Tottenham, for the erection of dust destructor buildings, at a cost of £3933 10s. 6d.

KNARESBOROUGH.—The Urban District Council has appointed a deputation to meet the Harrogate Corporation and the Knaresborough Rural District Council with respect to the provision of an isolation hospital for the district.

LEAMINGTON.—The Local Government Board has intimated its intention of sending an Inspector to inquire into the proposal of the Corporation to borrow £5500 for works of water supply, and £5010 for purposes of public walks and pleasure grounds.

CARNARVON.—At a recent meeting of the Town Council a long discussion took place touching a recommendation by the Sanitary Committee that a new reservoir be erected at Ysbytty, and that a new 8in. main be laid from there to the town at an estimated expenditure of £3309. The Committee's reccommendation was eventually adopted.

DOUGLAS (ISLE OF MAN).—The Corporation has decided to increase its water supply by the construction of a reservoir at West Baldwin capable of containing 300 million gallons. This will place Douglas in a magnificent position and provide for the requirements of the borough for the next generation. The holding capacity will be six times that of the Clypse reservoir. It will take five years to complete the new scheme, which will place Douglas with regard to its water supply in as good a position as any borough of the same size in the United Kingdom.

LAMBETH.—Dr. Priestley reports a death-rate of 14·6 per 1000 for the four weeks ending May 21st. Considering the immense area of the district, this compares very favourably with that of the metropolitan area, which was 16·4 per 1000. At the last meeting of the Vestry the Surveyor, Mr. James P. Norrington, tendered his resignation. He gave as his reason that it was impossible to carry out his duties efficiently with "the present insufficient staff." We think there must be good ground for this complaint, for Lambeth is notoriously in arrears with its work; and this state of affairs will continue, unless the Vestry obtain the help of contractors to make up some of the roads—work which in some cases has been paid for by the owners months ago.

BARMOUTH.—On Saturday Barmouth new waterworks were formally opened by Mr. T. W. Russell, M.P., Parliamentary Secretary to the Local Government Board. These works are situated amongst the Merionethshire mountains, and the reservoir contains a storage of 100 million gallons, of which 52 million gallons are for the supply of Barmouth, and will supply a population of 20,000 for 104 days. The works cost nearly £30,000. At a banquet held in the afternoon Mr. T W. Russell, in reply to the toast of "The Local Governing Bodies of the United Kingdom," spoke of the enormous and increasing work of the Local Government Board, and said that since its establishment it had sanctioned the spending upon sanitary work of £162,760,000. Whereas before the establishment of the Central Authority the expenditure upon sanitary work in the kingdom during ten years was only £2,956,000, the sum spent during the last ten years was £46,000,000. With due deference to those in favour of decentralisation, he contended that there was no tribunal in the United Kingdom where more fair play was shown than in Committees of the House of Commons and the House of Lords. He was in favour of the principle of local tribunals to deal with local affairs, but the difficulty was to find the best plan for devolution, and he did not look forward to a speedy settlement of that problem.

LONDON.—At the meetings of several of the Vestries last week it was reported that their horses had taken prizes at the great Cart Horse Parade at Regent's Park on Whit Monday.

BRADFORD-ON-AVON.—New baths have been erected at Bradford-on-Avon, as a memorial of the Queen's Diamond Jubilee. The cost of the baths is about £1400, and the style of the buildings is Gothic, Mr. S. Howard, Town Surveyor, being the architect.

WEST HARTLEPOOL.—Although the rate of mortality in West Hartlepool just now is down to 9·23 per 1000, the satisfaction to be derived from this apparently healthy condition of the borough is, Dr. Gourley reports, marred by the alarming mortality from pulmonary phthisis. It appears that during the period—one month—covered by Dr. Gourley's report, 25 per cent. of the deaths arose from phthisis. The Medical Officer regards this as a very serious matter, especially when it is remembered that more precautions are taken for the prevention of tubercular diseases in West Hartlepool than in most other towns. The doctor exonerates the meat and the milk, and concludes that the infection is inhaled with the air we breathe.

NEWINGTON.—This parish claims to be the pioneer in the matter of refuse disposal. Many years have elapsed since its first depôts were opened, and now further extensions are contemplated. A report from the Roads and Depôt Committee recommends the obtaining a loan of £5000 from the London County Council for the extension of the high-level dust sidings at Walworth, the construction of coal bunkers at the baths establishment, and the erection of three flats for the accommodation of Vestry employés. The sidings were originally designed to receive twenty-nine trucks, and were provided when the refuse of the parish was under 30,000 tons per annum. The great developments of recent years, together with the more rapid collection of street refuse, had more than doubled this quantity, hence the enlargement. It is stated by the chairman of the Committee that Newington removes its dust at a cost of 1s. per ton less than many other large parishes. One item in the above report is open to criticism. To spend £1897 on the erection of flats to accommodate three families is rather a big order. No wonder some members are of the opinion it would be cheaper to pay the men higher wages and let them find their own houses.

LONDON (CITY).—The following interesting abstract is taken from a report just presented to the Court of Common Council:—It is stated that some years ago the Corporation, with a view of testing the asserted monopoly of the New River Company to supply water to the City at prices reckoned on the rateable value of the premises without consideration as to the amount consumed, sank an artesian well in Stoney-lane, Houndsditch, to supply the artisans dwellings there. The quantity of water raised daily is about 33,000 gallons, or over 10 million gallons a year. Of this quantity about 22,000 gallons a day, or seven millions a year, are used for the purposes of the dwellings, leaving an available daily surplus of 11,000 gallons. The average quantity of water used annually for street watering and washing is 41 million gallons, for which the New River Company charge 9d. per 1000 gallons. The annual cost of pumping the water now supplied to the artisans' dwellings is £180, or about 5½d. per 1000 gallons, while the cost of the well has been £5610. The original charge made by the New River Company for a constant supply to the dwellings was £84 per annum. Thus the Corporation by their experiment have not only sunk nearly £6000, but are losing £100 a year in the expense of supplying the water. There are no means, without great additional expense, of utilising the surplus daily supply for watering the streets, and the Corporation have decided not to attempt it.

STOURBRIDGE.—The Local Government Board has issued a Provisional Order to the Urban District Council, authorising it to acquire two fields on which to erect a refuse destructor for its district.

HAYDON BRIDGE.—The Hexham Rural District Council has engaged Mr. Harry W. Taylor, of Newcastle-on-Tyne, to prepare a scheme for the water supply of Haydon Bridge, Northumberland.

COLNE.—The Town Council has resolved that the seal of the Council be affixed to an agreement for the purchase of thirty acres of land for the purpose of erecting an infectious diseases hospital thereon, at a cost of £2100.

HOPE.—The Parish Council has had referred for its consideration a report which has been prepared by Messrs. Sterling and Swann, civil engineers, of Chapel-en-le-Frith, for the supply of the village of Hope with water from Crookstone.

Personal.

MR. J. F. TABB has been appointed Medical Officer for the Greenwich East district.

MR. W. J. BOWDEN has been appointed Medical Officer of the Glossop union workhouse.

MR. F. WRIGHT has been appointed Medical Officer for the Escrick out-relief union, York.

MR. JOHN STORE has resigned the position of Town Clerk for Bath, after forty years' service.

MR. A. J. SAISE has been appointed Inspector of Nuisances for the urban district of Kingswood.

MR. HENRY JOHNSON has been appointed Inspector of Nuisances for the urban district of Wimbledon.

MR. R. B. SIDEBOTTOM has been appointed Medical Officer for the Whitfield district of Glossop union.

MR. W. T. DAVIES has been appointed Medical Officer for the second and third districts of Hertford union.

DR. STAINTHORPE has been reappointed Medical Officer for the Urban District of Skelton and Brotton.

MR. S. R. CHRISTOPHERS has been appointed Assistant Medical Officer of the Mill-road Infirmary, West Derby.

MR. W. D. WIGGINS has been appointed Assistant-Medical Officer at the Greenwich union workhouse and infirmary.

MR. R. BROWN has been appointed Surveyor and Chief Sanitary Inspector for the Vestry of St. Mary, Stoke Newington.

MR. WM. JAMESON, Assoc. of the San. Inst., has been appointed Assistant Sanitary Inspector for the borough of Scarborough.

MESSRS. J. HEMINGWAY and G. W. BRABYN have been appointed Medical Officers for the South Wimbledon districts of Kingston union.

DR. J. W. HUNT has been appointed Medical Officer for No. 7 district under the Hackney Board of Guardians, at a salary of £80 per annum.

THE Local Government Board has sanctioned the re-appointment of Dr. T. B. Young as Medical Officer to the Halesowen District Council, at a salary of £80 per annum.

Sewerage Schemes.

[To Municipal Engineers and Surveyors.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

The Tunstall Urban District Council has received the sanction of the Local Government Board to a loan of £22,300 for purposes of sewerage and sewage disposal.

The Wood Green Urban District Council has received a letter from the Local Government Board sanctioning the borrowing of £1549 for works of sewerage, £654 for purposes of public pleasure grounds, and £900 for Fire Brigade purposes.

At the last monthly meeting of the Lanchester Parish Council plans for the Lanchester village sewage disposal works, prepared by Mr. J. E. Parker, A.M.I.C.E., at an estimated cost of £1700, were considered, and the Council ordered the question to remain in abeyance for twelve months.

At a recent meeting of the Harrogate Town Council the Borough Surveyor (Mr. S. Stead) presented Mr. Dibdin's reports on the results of the analysis of the sewage, and submitted a sketch plan as to arrangement of bacteria beds which would be most suitable for the treatment of the sewage, and also his analyses of samples of sewage in effluent. It was resolved to adopt Mr. Dibdin's report, and that the same be printed and sent to each member of the Council.

At a recent meeting of the Leigh Council a heated discussion took place *re* the condition of the Leigh sewers, which cost £28,000 a few years ago. Several members said some of the main sewers were gradually silting up with solid mud, through the fall being scarcely perceptible. It was argued that had a deep sewer system with pumping arrangements been adopted, instead of the present nearly flat sewers, the cost would have been about £50,000 more. Further discussion was postponed until the Council's Surveyor had fully reported upon the condition of all the Leigh sewers.

The negotiations between the Derby Borough and County Authorities with a view to settling the dispute in the matter of sewage disposal, are progressing satisfactorily, and there are hopes of averting the litigation which the County Council threatened. On Wednesday evening, the 8th inst., the Town Council sat in Committee, when the Mayor, who has been interviewing Lord Waterpark (chairman of the Public Health Committee of the County Council), reported progress, and a Sub-committee was appointed with certain powers for the purpose of helping forward the final settlement.

The Castle Donington Parochial Authority met recently to receive and consider the plans of the proposed sewerage scheme for the parish. The proposed sewerage scheme, which is very extensive, has been under the consideration of the Parochial Authority now for several years, and the Committee has taken great pains in trying to get the very best scheme possible. The following resolution was passed by the Committee: "That the Parochial Authority of Castle Donington approve the sewerage and drainage plans as submitted, and recommends its approval by the Castle Donington District Council; and requests that Authority to instruct the civil engineer to draw up the necessary tracing to be submitted for the approval of the Local Government Board."

The Thames Conservators have prosecuted the Hartley Wintney District Council for alleged pollution of the rivers Hart and Whitewater, these being tributaries of the Thames. The case was dismissed, and the Conservators had to pay £3 3s. costs.

The Hambledon Rural District Council has been summoned before the magistrates by the Thames Conservancy Board for allowing the pollution of the tributaries of the Thames at Haslemere, Bramley, Wonersh, and Shalford. As steps are being taken to provide a drainage scheme, fines of £5 only were inflicted in the first three cases. At Shalford the matter has been dragging on for three years, and as there is no scheme the Council has been fined £30.

The Grange-over-Sands Urban District Council has adopted plans, and is making application to the Local Government Board for powers to borrow £10,000 to carry out certain improvements which have been under consideration for 3½ years. It is proposed that the sewage, which now drains upon the foreshore at various points, shall be collected and carried beyond the town along the railway embankment, outside which will be erected a promenade. The new sea wall will reclaim 5¾ acres of land, which will probably be used as a recreation ground.

An unopposed Bill to confirm a Provisional Order under the Land Drainage Act, 1861, relating to Hacconby Fen, Lincolnshire, recently came before the Chairman of Committees of the House of Commons. The object of the Order is to authorise a certain area in Hacconby Fen being constituted a separate drainage district, and to sanction the appointment of a Drainage Board of twelve members. A sub-section that the consent of the Black Sluice Commissioners should be obtained before the separate drainage area should be constituted was deleted, and the Bill as amended was ordered to be reported to the House.

After duly considering the report of the deputation which the Enderby Local Sanitary Authority recently sent to inspect the system of sewage disposal at Birstall (Yorkshire), the Committee has come to the unanimous opinion that a system with less elaborate machinery would, in a village like Enderby, very well answer the purpose, and consequently it was agreed to obtain all information possible respecting other systems. At a special meeting of the Local Sanitary Authority a letter was read from Mr. J. B. Everard, C.E., in which he advised that Dibdin's bacterial system of sewage disposal should be tried. After considerable discussion, it was unanimously agreed to ask Mr. Everard to submit plans and estimates of the system mentioned for the further consideration of the Committee.

A Local Government Board Inquiry has been held at Kessingland relative to the application of the Rural District Council to borrow £1200 for the purpose of sewerage and sewage disposal for the parish. Dr. Wynne informed the Inspector that the scheme related to that part of the village near the sea. The water would be pumped up and passed through bacterial tanks at a distance from dwelling-houses. It was hoped the effluent from the tanks would be such that it could be passed into the marsh dykes without being a nuisance to the inhabitants, or harmful to cattle. Mr. Filby the representative of the engineer, explained the details of the scheme, and said, in reply to a question, that it was not at present intended to deal with closets. The standard of purification would be very high. The rector objected that the upper village, whose rateable value was double that of the lower, would have to pay for the scheme and yet derive no benefit.

THE Local Government Board has sanctioned the borrowing by the Steyning District Council, on security of the rates, of £9100 for works of sewerage at Southwick, in the matter of the Southwick and Portslade drainage scheme, the loan to be repaid in a period not exceeding thirty years.

A LOCAL GOVERNMENT BOARD inquiry has been held respecting an application by the Newcastle Corporation for sanction to borrow £6500 for works of sewerage, and £833 for works of refuse disposal. The Town Clerk explained that the application for sanction to borrow £6500 was for the purpose of constructing sewers on the east and west side of the Ouseburn, near to its junction with the river, to take all the river sewage which now discharged into the open burn from several large sewers. Up to a few years ago the Ouseburn had really been an open sewer in consequence of sewage running into it, and it had become such a nuisance that it was necessary for the public health to divert the sewage from the Burn into common sewers. The £833 was for refuse disposal works at Elswick.

Lighting.

THE General Purposes Committee of the South Hornsey District Council recently reported that it had considered the question of incandescent lighting, and recommended that High-street, Stoke Newington, and Seven Sisters'-road be lighted with the holophone globe arrangement.

THE Blackheath and Greenwich District Electric Light Company has written the Lewisham District Board that it was concluding negotiations for the purchase of a site for its electric light station at Blackwall Point, which would be conveniently situated for the erection of a dust destructor, and that the company would be glad to enter into negotiations with the Board with a view to the erection of such for destroying the house and other refuse of the district. Referred to the Works Committee.

THE Board of Trade has issued copies of the new Provisional Order which it has just issued to the King's Norton Rural District Council, authorising it to supply electricity "for all public and private purposes" within the parishes of King's Norton and Northfield. The Order will come into operation as soon as it receives the confirmation of Parliament, and within two years from that time the Order requires the District Council to lay distributing mains along the principal thoroughfares.

As announced last week, the Local Government Board has issued a Provisional Order to the Corporation of Leeds to enable it to acquire the undertaking of the Yorkshire House-to-House Electricity Company, Limited. We now learn that the Order empowers the Corporation to create and issue such amount of Leeds Corporation stock "as will produce, by the interest or dividends thereon, an annuity of 5 per cent. per annum upon the sum properly expended by the company upon the undertaking, and chargeable to capital account," together with an amount equal to 5 per cent. on the capital for compulsory sale before the expiration of ten years from July 3rd, 1891. The Order further empowers the Corporation to make the stock redeemable "only by agreement between the Corporation and the holders of the stock for the time being," or if the company shall by arrangement with the Corporation agree to accept any part or the whole of the consideration in money, then the Corporation is authorised to issue "such amount of redeemable stock as shall be necessary to raise the amount of such payment in money."

IT is reported that a Provisional Order has been granted for the lighting by electricity of Penarth.

EARLSTON GAS COMPANY, after paying a dividend of 10 per cent. on last year's business, has just reduced the price of gas 10d. per 1000 cubic feet—namely, from 6s. 8d. to 5s. 10d. The North British Railway Company has refused to light the railway station with gas instead of oil on account of the expense, a numerously-signed petition to that effect having recently been presented to the company.

AT a recent meeting of the York City Council the Electric Lighting Committee reported that the Local Government Board had issued its sanction to the borrowing of £20,000 for electric lighting purposes, the money to be repaid within a period not exceeding twenty-five years from the date of borrowing. Professor Kennedy reported that Messrs. Crompton and Co. now found they could not recommend the lowest priced engines accepted by the Corporation. The Committee therefore had decided to instruct Messrs. Crompton to obtain the better-class engines mentioned in the tender, and the cost of the plant would therefore be increased from £8176 to £8654. The report was adopted.

A MEETING of Perth Gas Commission was held recently, to consider the estimates of the revenue and expenditure for the year, from 30th April last to 30th April, 1899. The total expenditure is estimated at £23,770 0s. 8d. In connection with the new gasworks a sum of £30,000 is proposed to be borrowed at 3 per cent., adding to the interest account the sum of £900. This latter is, of course, the principal feature of the estimates this year. To meet the estimated expenditure, including the interest for the new loan of £30,000, it is not proposed to make any increase in the gas rate. After consideration the estimates were adopted, and it was agreed, as stated, that the rate be the same as last year—3s. 2d. per 1000 cubic feet.

THE Board of Trade has just issued two new Provisional Orders, dealing with the electric lighting of the Holborn and St. Giles districts. By the first of these Orders the County of London and Brush Provincial Electric Lighting Company, Limited, are allotted an area, comprising so much of the district of the Holborn District Board of Works as lies west of the Gray's Inn-road and north of High Holborn, including Gray's Inn and Furnival's Inn, and so much of the district of the St. Giles District Board of Works as lies north of High Holborn and New Oxford-street. By the second of these Orders the Charing Cross and Strand Electricity Supply Corporation, Limited, are empowered to supply an area comprising the districts of the Holborn and St. Giles Boards of Works south of the area granted under the first Order, including Lincoln's Inn and Staple Inn.

TO OUR READERS.

The Editor solicits the co-operation of readers in making THE SANITARY RECORD *more attractive by means of pen-and-ink sketches, photographs, and diagrams. There are many phases of sanitary work which lend themselves admirably to illustration. By this means not only individual articles, but the journal as a whole will be brightened.*

Notes and Queries.

[Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to THE EDITOR, "Notes and Queries," THE SANITARY RECORD, 5, Fetter-lane, London, E.C.

NOTE.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

1118.—HIGHWAY: ENCROACHMENT ON: PROCEEDINGS.—"J. G." writes: "In the parish of A, in a rural district, several encroachments have been made on the highway by owners of property. Will you please advise whether the Parish Council can take proceedings under the Highway Acts?"

Answer.—No. The Parish Council have no powers to take proceedings under the Highway Acts. It is the duty of the Rural District Council to do so. The Parish Council may call upon the Rural District Council to take the necessary steps, and if they refuse to do so, Sec. 26 of the Local Government Act, 1894, enables the Parish Council to make complaint to the County Council, but the Parish Council are not enabled to institute legal proceedings to have the encroachment removed.

1119.—STONEWARE AND EARTHENWARE PIPES FOR DRAINS: DISTINGUISHING CHARACTERISTICS.—"J. E. L." writes:—"Will you kindly tell me the difference between a glazed stoneware pipe and an ordinary salt-glazed pipe, as I have never seen the difference stated? There are several manufacturers of drain pipes around here, but all the pipes they make are from fireclay. As this question was asked me at one examination, I shall be very pleased if you will answer it for me."

Answer.—Stoneware pipes are manufactured from clays obtained from Dorsetshire, which are more impermeable, tenacious, and stronger than fireclay or earthenware pipes. Numerous manufacturers throughout the country now claim that they are enabled to make stoneware pipes, and an analysis shows in many cases that the claims of these manufacturers are justified. Hence many firms now make and advertise both classes of pipes, *i.e.*, stoneware and earthenware. Stoneware pipes are, however, more costly than earthenware, but, being more tenacious, are made with a thinner crust than earthenware pipes. Fireclay or earthenware pipes, which are frequently advertised as salt-glazed pipes, are made from the fireclay beds of the coal measures. They vary considerably in their tenacity, porosity, and ductility, and many firms' earthenware pipes we have tested are not sufficiently impermeable as to withstand a pressure of 3ft. head of water without the latter coming through the body of the pipe. Such pipes are unfitted for sewage drains or sewers. It often happens, however, that pipes of such a porous nature have been improperly glazed. The term "salt-glazed" is applied to indicate that the pipe has been coated to render it impermeable, which is effected by throwing in salt when the kiln is being fired. Both stoneware and earthenware pipes are salt-glazed, the glazing, when properly done, having the effect of making the pipes impermeable, which enables them to resist abra-

INSURANCE.

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sion from matter in suspension in the sewage. Stoneware pipes are usually distinguishable in colour from earthenware in that they are of a pale buff colour, while fireclay pipes are of various shades of reddy brown and sometimes grey; when struck with a hammer, a stoneware pipe has a metallic ring, which is not the case with an earthenware pipe. They may also be distinguished in the test for impermeability. The pipes should be dried until they cease to lose weight, and then submerged in water for not less than twenty-four hours. Then remove, wipe dry, and re-weigh. The best pipe is that which absorbs the least amount of water, as it will be less susceptible to the wearing action of matter present in the sewage.

1120.—SEWERS: MANHOLES ARE PART OF SEWERS.—"J. T." writes: "We are about to lay a sewer through private lands, and it is very desirable that manholes should be constructed thereon. There is some doubt whether we have power to do this, and should be glad of your opinion."

Answer.—The Local Authority may construct manholes on the sewer in private lands, as these form a part of a sewer which they are empowered under Sec. 16 of the Public Health Act, 1875, to lay, after giving the necessary notices, as required by the section. See Swanston *v.* Twickenham Local Board, 43 J. P., 380. Where the Authority require to enter the lands for examination of the sewer by means of the manholes, they may do so under Sec. 305 of the Act.

1121.—WATER SUPPLY: WATER COMPANY NOT EXCLUSIVE MONOPOLY.—"W. J." writes:—"Please inform me whether a water company having Parliamentary powers can prevent the owner of a private estate from providing and supplying the houses thereon with water at a rate to be agreed upon?"

Answer.—A water company has not the power, to the exclusion of private owners, to the supply of water in any district. There is nothing to prevent the owner in the case named from providing the supply of water to houses or other property if he so desires.

1122.—UNSOUND MEAT AND FRUIT: BOOK ON.—"W. R." writes:—"I am in want of a good cheap book on fruit (unsound, diseased, &c.), also one on meat. Would you please say which you consider the best?"

Answer.—The following books may be recommended, viz.:—Vacher's "Food Inspector's Handbook," price 2s. 6d. net, postage extra; Walley's "Practical Guide to Meat Inspection," price 10s. 6d.; Winter Blyth's "Foods: their Composition and Analyses," price 21s.; Pearmain and Moor's "Analysis of Food and Drugs," price 3s. 6d. Our correspondent will probably find the first-named book will meet his requirements, as it treats of all classes of unsound food, including fruit. Any of the books may be obtained from the Sanitary Publishing Company, 5, Fetter-lane, London, E.C.

NOTE.—A number of replies to queries are unavoidably held over.

Contracts Open.

The dates given below are the latest up to which tenders can be received.

BELFAST.—June 21st. — Extension of Sewer. — The Clerk's-office, Workhouse.

EDINBURGH. — June 22nd. — Sewers. — The Burgh engineer, 1, Parliament-square, Edinburgh.

KIRKBY-IN-ASHFIELD.—June 22nd.— Scavenging. — Mr. G. H. Hibbert, clerk, 55, West-gate, Mansfield.

KING'S LYNN, June 22nd.—Sewer.— Mr. John R. Fayers, surveyor, 8, St. Nicholas-street, Market-place, King's Lynn.

RATBY (MARKET BOSWORTH).—June 22nd.—Sewers.—Mr. W. M. Sykes, sanitary surveyor, Park-street, Market Bosworth.

SEGHILL.—June 22nd.—Removal of ashes, &c.—Mr. Thomas Spencer, clerk, Seghill, Northumberland.

DITTISHAM (DARTMOUTH)—June 23rd.—Sewer.—Mr. Edwards, Higher Dittisham.

SUTTON COLDFIELD.—June 23rd.—Sewer, &c.—Mr. C. F. Marston, A.M.I.C.E., &c., borough engineer and surveyor, Town Hall, Sutton Coldfield.

EAST ARDSLEY (YORKS). — June 27th. — Drainage WORKS.—Mr. Edward Brook, Blackgates, East Ardsley, near Wakefield.

NELSON.—June 27th. — Sewering. — Mr. B. Ball, A.M.I.C.E., borough engineer and surveyor.

GREAT BERKHAMSTEAD (HERTS). — June 29th.—Sewers, &c.—The Engineer, 9, Victoria-street, Westminster.

RUNCORN. — June 30th.—Sewerage. — Mr. William Diggle, the Council's Surveyor, Holly Bank, Frodsham.

CHARTHAM DOWNS (NEAR CANTERBURY). — June 30th.—Drainage Works, &c.—Mr. W. J. Jennings, architect, 4, St. Margaret's-street, Canterbury.

Vacancies.

ASSISTANT DRAUGHTSMAN (HARROGATE, June 23rd).—For the Town Council. Salary, 30s. per week. Mr. J. Turner Taylor, town clerk.

ASSISTANT INSPECTOR (WESTON-SUPER-MARE, July 2nd).—For the Urban District Council. Salary, £1 per week. Mr. Sydney C. Smith, clerk, Town-hall, Weston-super-Mare.

ASSISTANT WORKSHOP ENGINEER (NIGER COAST, June 20th).—For the Marine Department of the Niger Coast Protectorate. Salary, £300 per annum, rising, if engagement be made permanent, by £50 per annum to a maximum of £400. Crown Agents for the Colonies, Downing-street, London, S.W.

BUILDING INSPECTOR (LANCASTER).—For the Corporation. Wages, £2 per week. For form of application apply to the Borough Surveyor, Town Hall, Lancaster.

BUILDINGS INSPECTOR (SOUTHEND-ON-SEA, June 23rd).—For the Corporation. Salary, £104 per annum. William H. Snow, town clerk, Southend-on-Sea.

CLERK OF WORKS (STAFFORD, June 25th).—For the Guardians. Mr. William Morgan, clerk, Union Offices, Stafford.

GAS AND WATER MANAGER (BIRSTALL, June 18th). For the District Council. Salary, £120 per annum. Mr. W. Middlebrook, clerk, Birstall, near Leeds.

GASWORKS SECRETARY (HOLMFIRTH, June 24th).—Chairman, Beech House, Holmfirth.

HIGHWAY SURVEYOR, &C. (WEALDSTONE, June 20th).—For the Urban District Council. Mr. R. J. Bryant, clerk, Council Offices, Peel-road, Wealdstone, R.S.O.

INSPECTOR OF NUISANCES (ST. ALBANS, July 4th).—For the Rural District Council. Salary, £100 per annum. Mr. R. W. Brabant, clerk, Poor Law Offices, St. Albans.

SURVEYOR.—For the North-Eastern Railway Company. Salary, £400. Secretary, North-Eastern Railway Company, York.

SURVEYOR (GUISELEY, June 22nd).—For the Urban District Council. Mr. Hugh Claughton, chairman, Guiseley, near Leeds.

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GEO. B. KENNETT,
Town Clerk.

Guildhall, Norwich,
13th June, 1898.

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The selected candidate will be required to commence his duties forthwith upon appointment, and to reside within the district.

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All communications should be addressed to the EDITOR at 5, FETTER LANE, London, E.C., and Cheques and Postal Orders should be made payable to THE SANITARY PUBLISHING COMPANY, Ld.

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THE

Sanitary Record,

JUNE 24, 1898.

A WELL-MERITED REBUKE.

We are not very much concerned as to what were the feelings of those members of St. George's, Southwark, who have so persistently refused to listen to their own Medical Officer, when they heard that a communication had been received from the Home Secretary with reference to the crypt of St. George's. Acting on the report of the Chief Inspector of Burial Grounds, Sir Matthew Ridley has issued a notice ordering the removal of the human remains from underneath the church. The Vestry has nothing but its own wilfulness and obstinacy to thank for this rebuke. But we do rejoice that the highest administrative Authority in the kingdom has upheld a conscientious and painstaking officer in the performance of his duty. We heartily congratulate Dr. Waldo on the complete vindication of his conduct. Had the Vestry listened to him at the outset all this friction with Whitehall might have been prevented, and the special circumstances of the case might have secured for Southwark a generous consideration in quarters where help could have been given.

Dr. Waldo is filling a most difficult position. The district he serves is an exceptionally crowded one; small tenements abound, and for generations the owners and lessees have done little more than gather in their exorbitant rents. When Dr. Waldo entered upon his duties he found a death-rate equal to any, and far above most, of the districts in the metropolis, and he resolved to do his utmost to change so undesirable a record. He marked out the foulest dens; he made a complete tour of the district, and noted the spots where even the elementary requirements of sanitation were unknown. Armed with these facts, he went before his Vestry and invited it to take action. But he found himself thwarted on every hand. The consideration of his reports was burked, or constant adjournments were made. Attempts have been made to edit his reports, but they have failed; and a less earnest and persistent officer would have thrown up the task long ago.

But in every point that Dr. Waldo has been resisted by the Vestry he has been upheld by the central Authority. Still he has ever been generous to those who have been his most bitter opponents, and never turned to rend them in the hour of victory, thus proving that he is no mere seeker after notoriety, but a conscientious public officer. To such men as this our country owes a debt of gratitude. They place their duty to the community far above the mere favour of interested individuals. It is for this reason that we rejoice in the vindication of Southwark's Medical Officer, and that the Vestry has again been taught that its duty is to look after the welfare of its constituents, and not waste its time in attacking its officials.

Notes.

Last Tuesday at the County Council.

The meeting of the London County Council on Tuesday last was of more than ordinary interest. Yet another proposal was put forth for opening up a new channel of communication between Holborn and the Strand. Let us hope this will be the final attempt, and that not only will the Council approve of it, but that it may pass through Parliament next session, and in a year or so become an accomplished fact. The estimated cost of the new scheme is not so high as its predecessors, but it appears to be quite as efficient. The other recommendation receiving most attention was contained

in the report of the Local Government and Local Taxation Committee, in which the Council was asked to adopt a series of new bye-laws. An end is to be put to the nuisances of the streets. The inhabitants of private thoroughfares will be particularly thankful for this, as these have been the "happy hunting ground" of the vendor of sensational news—real or imaginary. The organ-grinding affliction will still have to be endured, unless the householder will have the courage to have its exponent "moved on." But the owners of "miserable curs" and of "crowing cocks" must beware, for under the new bye-laws these must be silenced or removed to more open and congenial neighbourhoods. After all, we may yet know what it is to have quietness in the streets of London.

An Economical Sewerage System.

At a time when so much is being written about "new" sewerage schemes and systems, it is well for us to know what has really been accomplished. The history of the Winsford experiment may be familiar to many of our readers, but to a large circle of sanitarians the article appearing in last week's *Engineer* will come as a surprise. It is a plain unvarnished story of what may be done by making use of the material at hand instead of sighing for something miles away. Winsford is in the centre of the salt industry, and from the various factories is given out vast quantities of "cinders, basses, clinkers, and ashes." When twenty years ago the newly-formed Local Board found itself called upon to provide a sewerage system for two villages with 12,000 inhabitants, it was fortunate in having an engineer who saw in this "rubbish" just the material for the task. The article goes on to show how filter beds were constructed near the banks of the river Weaver, how these are worked alternately, and how the process of purification proceeds "intermittently and almost automatically," with a result that, although the effluent flows directly into the river, "the bright, clear water of the Weaver along the edge of the cinders affords not the slightest trace of discoloration or pollution." Happy Winsford, what would many a larger place give for such a record. And the cost? Why £300 covered the outlay on the filtration works, and £50 per annum keeps them in working order. This contribution to the drainage discussion is very timely. We do not say it is possible for every place to obtain so satisfactory a result at so low a price; but it does prove that, if we will only allow nature to help science, "economical sewage disposal" is something more than an "ideal"—it is a fact.

The "Low Flash" to be Maintained.

Forecasts of the report of the Petroleum Committee have been pretty numerous within the last week, but generally they agree that there will be no recommendation to increase the flashing point of ordinary petroleum. It would appear that those who have been blaming the oil for so many explosions and fires have been upon the wrong track. "It's not the oil at all, at all." It's the lamps that have been at fault; at least, that is what must be inferred from the finding and recommendation of the Committee. Might not the man who gets drunk say with almost as much reason, "Shure, and it's not the liquor at all that did it; begorra, it was the pot that held it!" No, Mr. Collings, it won't do. The British public knows that explosions occur to low-flash oil, and that this source of danger in their homes will be removed if the standard is raised. The question of "cheapness" is beside the mark. The first point for the Government to consider is the safety of its subjects, and if the Committee had confined their attention to that, the result of its deliberations might have been different. The *Star* deserves every credit for the way it has brought this important question to the front.

The Camberwell Dust.

Thanks to the enterprise and energy of its Clerk, the Camberwell Vestry has saved itself from the threatened action of the London County Council. The story of how this was accomplished was told at the meeting of the Vestry on Wednesday week. Instead of wasting time and money in fencing with the County Council, the Clerk had gone direct to headquarters and frankly admitted the justice of the charge preferred—that a proper collection of house refuse did not take place in the district. He then asked for time, and "undertook that if this was granted he would see that immediate measures should be taken to ensure the efficient carrying out of the Council's bye-laws," and then it was shown that in the course of a few days, with a little re-arrangement of the Works Department, the weekly removal of dust had been accomplished. But what a pity the Vestry had not taken this common-sense step before, instead of "dilly-dallying" for eighteen months, and running the risk of losing a substantial contribution from the Equalisation Fund, besides being involved in a costly lawsuit. It is difficult to find out the reason for this "folly," unless it is that the Vestry deemed itself wiser than its Surveyor, who urged it to comply with the rules of the County Council. We believe his recommendations were rejected on the ground of "economy." But to break the law is always a dear process, and we think Camberwell will, when its next rate is made, find this out to its cost.

"Yellow Jack" Circumvented.

The *Pall Mall Gazette* is responsible for an important item of news from Rome. We are told that a young Italian doctor has discovered a remedy and preventive for yellow fever. If this be true, the value of the discovery cannot be overestimated, and Italy may well be proud of its clever young medico. Dr. Sanarelli, who is but thirty-four years of age, spent the early part of his professional career at Pavia; from thence he went to Munich, finishing his training under Pasteur in Paris. Thus prepared, he went out to Uruguay to found an Institute of Hygiene at Montevideo. What he has experienced during the last three years we will let him tell in his own words:—"I started," he said, "with the intention of devoting my whole energies to yellow fever, so on my arrival at Montevideo I shut myself up on the Isle of Flores, where there is a lazarette. There I followed the course of the disease from the beginning to the usually fatal end,

trying to find the terrible microbe. The first results were most discouraging, but finally, in the blood of a still living man, I found a characteristic micro-organism, present in great quantities in the body. After long and laborious research, I produced a powerful toxine, which, in animals, produced all the phenomenon of yellow fever. With human beings the result was extraordinary. Brazil at once begged me to go to the State of San Paulo, so I left with a scientific commission for San Carlo do Pinhal. This city, at one time containing 27,000 inhabitants, to-day reduced to 1000, is a most potent centre of infection. It is a city of empty houses and deserted streets, the few inhabitants all dying or convalescent. The mortality in the hospitals had been 87 and even 90 per cent.; with the toxine it was reduced to 27 per cent. We tried the cure in the gaols with great success. Formerly, when one case in the prisons or barracks broke out all the prisoners contracted the disease. During my sojourn at San Carlo do Pinhal a prisoner died; the others were at once injected with serum, and not one had it. The people really give me more credit than is my due. They seem crazy with joy, but it is a reprieve from death for a very large proportion of the population. The origin of the bacillus is heat and damp. It is in the air, and so very much more difficult to reach. The difficulty at present is to obtain sufficient serum, but I hope that difficulty will soon be overcome."

Acetylene Gas for Towns.

At a time when there seems to be a revolution in the lighting arrangements of our streets, the exhibition of acetylene gas apparatus at the Imperial Institute may be the means of making some public bodies think whether after all it is necessary to rush into the extremely expensive luxury of electric lighting. Especially is this the case with regard to villages and small towns. A glance at the exhibits at the Institute shows that in acetylene we have an agent capable of providing a brilliant light at a much lower cost than it is possible to produce coal gas in such places. For instance, the Manchester Acetylene Company has, we understand, a contract in hand to provide a town in Banffshire with light at a cost of what is equivalent to 3s. 4d. per 1000 cubic feet of coal gas, against 8s. 4d. per 1000, the price at present paid. It is only fair to say that the old pipes and mains are being utilised. As the manufacture of this gas developes, we have no doubt the production of carbide of calcium will be still further increased, and the price correspondingly reduced. And in this may be found the agent for cheaply lighting the semi-rural parts of the country.

The Vaccination Bill in Committee.

A good start was made last week with the Committee stage of the Vaccination Bill, and several important amendments were disposed of. The first of these was a proposal to limit the operation of the Act to three years, on the ground that its compulsory character was confessedly rested on the discovery of glycerinated lymph, a discovery which, it was pointed out, had yet to await the test of time, and could not at present be regarded as other than experimental. It was a specious argument, and enlisted considerable support, but the Government stuck to their guns, and the amendment was thrown out. Sir Charles Dalrymple, who is now the only survivor in Parliament of the Royal Commission, probably gauged the character of the amendment correctly, when he declared that it was in reality a disguised form of attack on the Bill itself. Another amendment which shared the same fate was one proposed by Mr. Gedge, providing for the payment of a small fee—a shilling or so—to every parent bringing a child to the public vaccinator. We believe that some such system prevails in France, its object, of course, being to disarm opposition to vaccination; but it is open to doubt how it would work in this country, and whether it would really effect the end aimed at.

Alteration of the Age Limit.

The most important decision, however, arrived at by the Committee was the alteration of the age limit from twelve months, as proposed by the Bill, to six months, which is the age prevalent in Scotland. Mr. Chaplin has before this pretty clearly indicated his preference for the higher age, but he had to give way to the arguments with which he was assailed, and especially in view of the fact that both the medical members, Sir Walter Foster and Sir William Priestley, were ranged against him. The great argument for the six months' age is, of course, the experience of Scotland, where it is known to be a success, whereas there is no such guide in regard to a twelve months' limit. Then, again, uniformity is much to be desired, and there is no reason in the world why the practice should vary in different parts of the kingdom. And, finally, to clinch matters, experience has shown that the longer the age is deferred the more difficult does it become for the vaccination officers to trace children. Already the proportion of unaccounted for cases is far larger than it should be, and as it is quite certain that it will increase with the extension of the age limit, it is desirable not to extend the limit more than is necessary.

The Honour to Lord Lister.

Edinburgh, the seat of one of the most famous medical schools of the world, has conferred a signal honour—the highest in its power to confer—on one of the most eminent surgeons of our time. In bestowing on Lord Lister the freedom of the city, our "Modern Athens" marked its high sense of the inestimable benefits he has conferred on medical science and on humanity by his discoveries in connection with antiseptic surgery. He is able to recall the time, at the commencement of his career, "when every operation was attended by terrible pain and fearful danger." To Sir James Simpson, also an Edinburgh professor, we owe the elimination of pain from surgical operations by means of anæsthetics; to Lord Lister is due the distinction of having been the first to apply to surgery the antiseptics which have removed the subsequent danger. By these two great discoveries surgical science has been revolutionised, so that now operations are successfully performed which would have been deemed

impossible in an earlier age. Surely the highest glory that any human being can achieve is to have been the instrument of saving life and diminishing the sum of human suffering; and no man has a higher claim to that distinction than Lord Lister.

Munificent Gift to Edinburgh University.

A very handsome gift by a donor whose name has not yet been disclosed has been made to the University of Edinburgh. This unknown benefactor has intimated his intention of giving such a sum, not exceeding £10,000, as may be necessary to build and equip a laboratory and class-room to be used exclusively for the teaching of public health, in connection with the chair on that subject which is about to be established in the University. The University is to provide the site for the proposed building. It is a princely and a most practical gift, and in acknowledging it the University Court has expressed its gratification that the gift has taken a form which enables the University to extend its usefulness by the provision of an institute which is urgently required for promoting the study of public health. It is hardly necessary to point out what an immense gain the new laboratory will be in connection with practical instruction in sanitation. If all our Universities were similarly endowed, the scientific study of hygiene would receive a stimulus that it is not easy to estimate. Under present conditions, in many centres of instruction, the tendency is for students to be imbued with merely theoretical knowledge, whereas there is no subject that requires practical illustration, in order to its intelligent apprehension, more than sanitary science.

Tenure of Office of Public Health Servants.

It will be interesting to Public Health officials to know that the Urban Clerks' Association, whose offices are at 22, Great George-street, Westminster, S.W., are promoting a Bill in Parliament, the object of which is to secure to the officers of District Councils the same security with regard to the tenure of their offices as is now enjoyed by the officers of Poor Law Unions, namely, that they may not be dismissed without the sanction of the Local Government Board, and on reasonable cause shown. We sincerely hope that such a Bill may become law, for it is, in our opinion, little less than a blot upon sanitary administration that officers of Sanitary Authorities, who in the very nature of things, if they carry out their duties in a proper spirit, must come in conflict with some of the members of the Authority who employ him. We know, unfortunately, of too many cases where local builders obtain seats on Urban and Rural Councils for the express purpose of clogging the wheels of sanitary progress, and checking the action of sanitary officials, and where zealous officers have been compelled to resign their appointments owing to the persecution of this class of member, and we have a case at the present moment where an official holding the combined office of surveyor and inspector, has been served with notice to terminate his appointment owing to his advocacy of the necessity of Building Bye-laws being framed and enforced to regulate new buildings. The jerry-builders were a force on this particular Council, and their clamour that the cost of buildings would be increased if building bye-laws were put in force, outweighed all considerations of the health and comfort of the future inhabitants. Such action is a disgrace to any Sanitary Authority, and also a blot on our system of public health administration. We cordially wish the Bill success.

Plague Spots.

An extraordinary report has been issued by Dr. Bates, the Medical Officer of Health for Bethnal Green, as to the exceedingly unsanitary condition of the tenements in that district. In Faith-street, in Cambridge-road, overcrowding prevails to a startling extent, and in many instances the rooms are too damp to sleep in. Consequently the poor folks are compelled to herd together in one or two rooms "like herrings in a barrel." Out of 47 houses in Pitt-street occupied by 259 persons, 27 are unfit for human habitation, and 11 out of 12 houses in Lucas-street have been condemned. Medical officers who do not shirk their work expose these plague spots, and it is the duty of Vestries to stamp them out altogether. To permit such inhabitable places to remain any longer would be detrimental to the health of any neighbourhood.

The Pay of the Nurses.

We observe from the *Bombay Gazette* that much dissatisfaction has been caused by the treatment that certain of the nurses sent out to India by the Secretary of State has received at the hands of the Government. Their pay for the month of March, as agreed on by the Secretary of State, was to have been 175 rupees; but when matters came to be settled, a number of deductions were made—representing certain advances, boarding charges on their arrival from home, and before they were provided with free quarters at the hospital, and charges by the Committee's contractor for the supply of food—that brought the balance due to these nurses, after a month of hard work, down to about four rupees! The deductions were made under the authority of the Accountant-General, and seem to have been partly due to red-tapeism; for though the individual members of the Plague Committee felt the result to be little short of scandalous, they appear to have been without authority to grant any concession without official sanction. Part of the boarding charges, it is true, were subsequently refunded; but even so, the remuneration received was miserably inadequate for the services of these brave women. It is to be hoped that "someone had blundered," and that the blunder has been, or will be, rectified; for assuredly the Government cannot expect nurses to undergo the self-sacrifice entailed in plague duty if they are to receive such scurvy treatment.

We beg to draw the attention of our readers to the announcement of Mr. Hamblett in our advertisement pages. He has decided to convert his well-known business into a limited liability company. The blue bricks manufactured by this firm are celebrated all the world over, and investors have an opportunity of becoming interested in what appears to us to be a sound and progressive firm.

THE CHEMICAL AND BIOLOGICAL ANALYSIS OF WATER.

By T. H. Pearmain and C. G. Moor, M.A. (Cantab).

Members of the Society of Public Analysts. Authors of "Applied Bacteriology;" "The Analysis of Food and Drugs," &c.

(*Continued from page* 641.)

TOTAL HARDNESS.

In making tests a stoppered bottle holding about 150 c.c. should be used, and the soap solution is added at about the rate of 2 c.c. for each successive addition, and when the liquid shows signs of lathering, the bottle should be laid on its side, and the lather should last as nearly as possible two minutes. Great care should be taken not to mistake the peculiar scum yielded by magnesium salts for the typical soap lather.

PERMANENT HARDNESS.

If the "total hardness" exceeds ten grains per gallon, it is advisable to see whether it is due chiefly to carbonate of calcium (temporary hardness) or to the sulphates and chlorides of magnesium and calcium (permanent hardness). This is done by boiling 70 c.c. of the sample down to about 40 c.c., when the chalk will be precipitated; the liquid is then made up to 70 c.c. and tested with the soap solution, as mentioned above.

HEHNER'S METHOD FOR THE ESTIMATION OF HARDNESS.

In this process, the calcium and magnesium carbonates, which cause the temporary hardness, are first determined by titration with standard acid. Both the carbonates and sulphates of calcium and magnesium are then precipitated by adding a known volume of standard sodium carbonate solution in excess and boiling for half an hour. The unchanged sodium carbonate is then estimated by means of standard acid. The amount of sodium carbonate which is decomposed by the above sulphates is thus found, and from this the permanent hardness can be calculated.

Temporary hardness.—70 c.c. of the sample is made hot in a dish and then titrated with $\frac{N}{50}H_2SO_4$ using phenoacetoline 0·2 per cent. solution as indicator. Each cubic centimetre of acid used is equivalent to one grain per gallon of $CaCO_3$.

Permanent hardness.—Take 70 c.c. of sample and add about as many cubic centimetres of $\frac{N}{50}$ Na_2Co_3 solution as there are grains per gallon of non-volatile solids. Transfer to a platinum dish and evaporate to dryness on a water bath. Take up with recently boiled distilled water, which must be quite cold, then filter, wash residue well, and make filtrate up to about 70 c.c. This is raised to boiling point and titrated with $\frac{N}{50}$ H_2SO_4, using phenoacetoline as indicator. The number of cubic centimetres of acid used deducted from number of cubic centimetres of $\frac{N}{50}$ Na_2CO_3 used, equals grains per gallon of permanent hardness.

The total hardness is obtained by adding the sum of the permanent and temporary hardness.

It is of interest to note that each degree of hardness represents a soap-destroying power equivalent to 2½ oz. of soap per 100 gallons of water.

A greater hardness than 30 parts per 100,000 is undesirable from the hygienic standpoint. The higher the ratio of "temporary" to "permanent" hardness the better. The hardness of waters may be classed as follows:—

Very soft	3 to 5	parts per	100,000
Moderate	5 to 10	,,	,,
Hard ...	10 to 30	,,	,,
Very hard	above 30	,,	,,

For successful brewing purposes waters containing large amounts of "permanent" hardness are valued. In the brewing of light ales the sulphate of calcium tends to keep out the colouring matters of the malt. The water of Burton-on-Trent contains from 28 deg. to 30 deg. of permanent hardness.

PHOSPHATES IN WATER.

Phosphates in water can in most cases be only of sewage origin. Absence of phosphates, however, is no proof that the water is free from sewage pollution, since substance like iron and alumina, which are present in all soils precipitate phosphoric acid; and plants derive their phosphorus from it, and thus remove it from the soil.

As small a quantity as ·0005 of a gramme of calcium phosphate will yield a yellowish turbidity with ammonium nitrate and ammonium molybdate, so that any appreciable quantity would be detected by treating the ignited total solids with the least possible quantity of nitric acid, neutralising with ammonia, evaporating the filtered liquid in a porcelain dish to a bulk of ·5 of a centimetre, adding a drop of strong nitric acid and a few drops of 10 per cent. solution of ammonium molybdate, and warming the whole to 60 deg. Cent. If it is desired to estimate the amount present, 1000 c.c. of the water should be evaporated and the same procedure carried out, the precipitate collected on a small filter, washed with spirit and ether and dried, when the weight obtained multiplied by ·0373 will give the result as P_2O_5.

O. Hehner (*Analyst* 5, 135) published determinations of the phosphoric acid in a number of different waters. He concludes that when the phosphoric acid is above ·5 parts per million the water should be regarded with suspicion, but that the absence of phosphoric acid is not a positive proof of freedom from pollution, as some waters known to be polluted, when examined by him, contained very little or none.

J. West-Knights (*Analyst* 5, 180) has described a colorimetric process for the estimation of P_2O_5 in waters, which he verified by comparison with the gravimetric process.

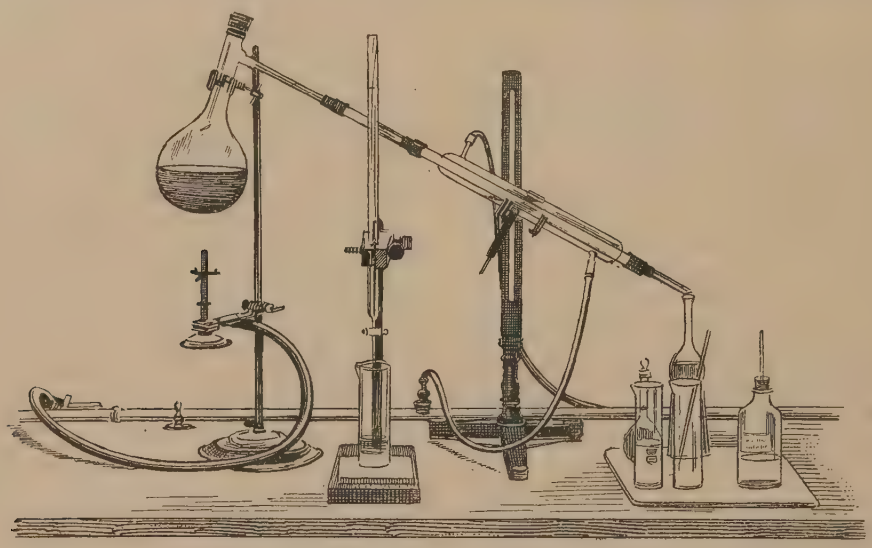
Sidney Harvey, in the same number of the *Analyst*, gives results obtained on an old well, which had been closed for some time, situated near an ancient churchyard. He found as much as five grains of nitrates and one grain of phosphoric acid per gallon.

POISONOUS METALS.

The metals which we have occasionally to seek for in water are lead, copper, and iron.

These are usually tested for by placing 100 c.c. of the water to be tested in a nessler glass, and passing a slow current of sulphuretted hydrogen through it, having previously added a single drop of

strong hydrochloric acid. If a dark cloud forms it must be due to one of these three metals, and we may either proceed by concentrating the water, or we may at once test for lead by adding potassium bichromate or potassium iodide. In both cases a yellow cloud will form after an interval. If lead is present, about 1-50th of a grain per gallon (2·8 parts per million) can be detected in this manner. An approximate estimation of lead in water can be made by comparing the tint produced on passing sulphuretted hydrogen gas into 100 c.c. of the sample, and then making up a tint to correspond with it, by adding so many centimetres of a standard solution of lead acetate to 100 c.c. of distilled water in another nessler glass and passing the gas through it. This method is satisfactory for all potable waters; but in the case of aërated waters containing vegetable acids, sugar, or organic matter, it is advisable to adopt the method described by Dr. F. L. Teed (*Analyst*, vol. xvii., 142).



Apparatus used in Wanklyn's Process.

Those substances which would cause the reduction of potassium bichromate do not interfere with the production of lead sulphide, and Dr. Teed's process also provides against the precipitation of copper and iron, both of which may be present in small quantities in aërated beverages. He proceeds as follows:—

The liquid to be tested is placed in a nessler glass, and a few c.c. of ammonia and a little potassium cyanide added, and then a small quantity of ammonium sulphide. Any coloration then produced is due to lead alone, copper and iron not interfering. The lead sometimes found in aërated waters may be due to the metal work in the case of syphons, but is apparently sometimes due to the action of the liquid on the glass. When such beverages (soda-water, ginger-beer, lemonade) are examined under the Food and Drugs Act, it is essential that three bottles should be purchased and opened, their contents mixed in a jug in the presence of the vendor, and then poured back into the bottles and sealed up.

In testing aërated, and, indeed, ordinary potable water for lead, it is well to confirm its presence by the bichromate test, which must in the case of beverages be performed after the destruction of the organic matter present, by evaporating in a porcelain dish and igniting very gently with a drop or two of strong nitric acid to destroy carbon. The residue is then taken up with water, and a few drops of nitric acid and potassium bichromate added. A comparison can then be instituted, using a standard lead acetate solution treated in the same way.

Copper is not found in natural waters in this country, except possibly in the neighbourhood of copper lodes, but is common in some countries—for example, Barbadoes.

It is a disputed point how far copper is a dangerous poison in small quantities, and it is a more common constituent of many foods (such as wheat, cocoa, oysters, &c.) than is generally supposed.

It is probable that copper is less dangerous than lead, but no water should be passed as satisfactory which contains as much as one-fiftieth of a grain of the metal per gallon.

The power of certain waters to attack lead is considerable, and while very soft waters are most notable for their plumbo-solvency, there are several causes which conduce to the action of water on lead.

Pure water, *e.g.* distilled water, has a decided action on lead, particularly if the lead is sometimes exposed to air, as might be the case in an intermittent service. This action is prevented if even small quantities of calcium salts and silica are present. Again, the presence of large quantities of nitrates or of chlorides is said to give water the power of acting on lead.

Probably the presence of a large quantity of carbonic acid and of vegetable acids, such as occur in a surface water collected in moorland districts where peat abounds, is the most important cause of plumbo-solvency. In such waters it is likely to be found that the action is greatest in the autumn, when the decaying vegetation imparts a greater quantity of carbonic acids and vegetable acids to the water than at other times of the year.

Many widespread outbreaks of lead-poisoning have occurred in the past in districts supplied with moorland surface waters, but the reported cases have very greatly diminished of late years as the lead pipes were gradually replaced by tin, tin-lined lead pipes, or iron pipes. Probably the best pipe is that known as the "Health Pipe," which is an iron pipe lined with tin.

A valuable and detailed examination into the causes of plumbo-solvency was carried out by Dr. Power, Dr. Houston, and others, at Settle, and will be found in the Medical Officer's Report, 1893—1894, Local Government Reports. In their investigations a very important point was clearly shown, namely, that the plumbo-solvency of a water collected from a peaty ground is influenced largely by the length of time the water stands in peat, if the water sinks into the ground and reappears again in the form of springs it loses its power of action on lead, whereas that water which drains away from water-logged peat acts on lead in a marked manner.

An outbreak of lead-poisoning in Sheffield, which is supplied with a water from a moorland collecting ground, was successfully dealt with by artificially hardening the water by passing it over limestone; this plan is still in operation and has since been adopted elsewhere.

In the investigation above referred to, Dr. Houston succeeded in isolating from peat infusion two bacteria, which he has baptised "O" and "Q" which when grown in peaty water produce a considerable degree of acidity and cause the water to act on lead. As regards the quantity of lead that should be permitted in drinking water, the facts that lead is a cumulative poison and that the plumbo-solvency of a water will probably vary with the season, point very strongly against the advisability of passing a water containing even the smallest traces. Phosphate of lead is very insoluble, so that if water containing lead is passed through an animal charcoal filter (which, of course, contains calcium phosphate) all lead will be removed from the water.

DETERMINATION OF ORGANIC MATTER.

The determination of the organic matter—that is to say, the extent of the animal or vegetable pollution—is the most important factor in the sanitary analysis of water.

The three most important processes in use for the determination of the organic impurity in water are the following:—

(*a*) The free and albuminoid ammonia process.
(*b*) The moist combustion or oxygen "consumed" process.
(*c*) The combustion process of Frankland and Armstrong.

The combustion process of Frankland, although a very ingenious process, is not in very frequent use, owing to the fact that it requires very elaborate apparatus and is unfortunately liable to numerous sources of error even in practised hands.

THE FREE AND ALBUMINOID AMMONIA PROCESS.

This process was devised by Wanklyn and Chapman in the year 1867, and is now in use by water analysts all over the world. The object of this process is to obtain an indication of first the amount of organic matter in a given water, by estimating the amount of free or saline ammonia, and secondly determining the "albuminoid" ammonia by boiling with a strongly alkaline solution of potassium permanganate. This decomposes the organic matter present in the water with the evolution of a further quantity of free ammonia.

ESTIMATION OF FREE OR SALINE AMMONIA.

The process is usually worked as follows:—500 c.c. of the water to be examined are placed in a retort or flask capable of holding at least 1200 c.c. and connected to a Liebig's condenser.

A side tube flask is preferable to a retort, as it is far more difficult for splashings to pass into the distillate than in the case of a retort.

A small quantity of sodium carbonate (about half a grain) is added to the water to ensure the liberation of any ammonia that may be present as chloride, sulphate, nitrate, or any other non-volatile salt. Sometimes this addition is not necessary, owing to the water being slightly alkaline naturally, but it is preferable not to omit it in any case. It is customary to distil over one-tenth, that is, 50 c.c., into a Nessler glass which has previously been rinsed with ammonia-free water. As a matter of experience, it is found that in the case of most waters three-quarters of the total saline ammonia will be present in the first tenth, and it is therefore customary to add on one-third of the ammonia found in the first cylinder, and to take this as representing the whole saline ammonia rather than to nesslerise the succeeding distillates.

(To be continued).

LIME, MORTAR, AND CEMENT: THEIR COMPOSITION AND ANALYSES.

By W. J. DIBDIN, F.I.C., F.C.S., &c.

CHAPTER V.

(*Continued from page* 616.)

The appended tables, Nos. IV. to VII., contain the results of the analyses of some typical samples.

Table No. IV. shows the results of the analyses of five samples of cement mortar.

Table No. V. shows the results of the analyses of three samples of bad mortar.

Table No. VI. shows the results of partial analyses of fifteen samples of very bad mortar; in these the analyses were carried only far enough to show that all the samples contain excessive quantities of earthy matter and old mortar; and also that they were deficient in freshly-burnt lime.

In contrast with these, Table No. VII. shows the result of the partial analyses of a sample of good mortar taken from a public building in course of erection. In all the following tables the results are stated in percentages.

The average total lime in cement may be taken as 60 per cent.; therefore, the lime found, including that carbonated, may be corrected to volume of cement thus:—Sample No. 1—CaO = 11·8 + 1·6 carbonated = 13·4 = 22·3 of cement; add one-eighth for correction to volume = 25·1 vols. of cement to 67·34 of sand, or a ratio of 1 : 2·7.

TABLE IV.

Analyses of Samples of Cement Mortar.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Moisture, water of hydration, &c. ...	7·50	6·12	7·72	7·26	9·68
Lime (CaO)	11·80	10·87	11·97	9·20	11·24
„ carbonate ...	2·86	2·86	1·04	1·87	1·45
„ sulphate ...	0·20	0·30	0·99	0·84	0·71
Iron oxide and alumina	4·35	3·75	4·00	4·95	4·00
Soluble silica	3·25	2·50	3·25	2·00	2·25
Earthy matter ...	0·61	0·64	0·96	0·85	0·70
Loss of ignition ...	2·09	2·19	2·42	2·50	2·02
Sand and grit ...	67·34	70·77	67·65	70·53	67·95
Total	100·00	100·00	100·00	100·00	100·00

Ratio of Cement to Sand, &c.

Calculated on the Soluble Silica.

1:3·5 ... 1:4·5 ... 1:3·5 ... 1:5·6 ... 1:4·8

Calculated on the Lime.

1:2·7 ... 1:3·0 ... 1:2·9 ... 1:3·0 ... 1:3·0

TABLE V.

Bad Lime Mortars.

	No. 1.	No. 2.	No. 3.
Moisture, water of hydration	17·1	21·1	15·1
Lime (CaO)	5·9	6·0	6·2
„ carbonate	8·9	8·4	8·0
„ sulphate	1·8	1·7	2·0
Sand, grit, broken brick, &c.	51·5	46·3	53·4
Iron oxide and alumina ...	1·6	1·4	1·5
Soluble silica	0·9	0·7	0·7
Earthy matter	7·4	10·4	8·1
Loss on ignition	4·9	4·0	5·0
Total	100·0	100·0	100·0
Commercial lime (CaO) to sand and grit, &c., by volume	1 to 5·5	1 to 4·9	1 to 5·5
Commercial lime (CaO) to all other matters by volume	1 to 8·3	1 to 7·7	1 to 8·1

It will be noticed, however, that the calculation of cement from the lime found is unsafe, as the mortar might be sophisticated with lime, and therefore not *cement* mortar. The soluble silica is the only reliable indicator.

TABLE VI.

Partial Analyses of Very Inferior Mortars.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.
Moisture	3·13	3·61	3·42	2·80	2·79	3·00	3·22
Lime (CaO)	7·48	8·72	5·68	7·71	6·11	6·00	6·73
Lime carbonate	12·61	13·18	15·45	11·36	15·79	14·66	16·34
Sand, grit, &c.	58·90	54·85	57·14	58·76	59·09	55·36	55·84
Earthy matter	8·44	7·39	8·68	7·57	7·65	9·94	9·27
Iron oxide, alumina, and soluble silica	3·75	2·90	3·00	4·50	3·30	2·60	3·20
Commercial lime (CaO) of 80 per cent. to all other matters of volume	1 to 5·0	1 to 4·2	1 to 6·4	1 to 4·8	1 to 6·1	1 to 5·9	1 to 5·3
Commercial lime (CaO) of all other matters by volume...	1 to 7·6	1 to 6·4	1 to 10·2	1 to 7·4	1 to 9·5	1 to 9·7	1 to 8·5

	No. 8.	No. 9.	No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.
Moisture	3·87	10·28	4·64	3·68	3·93	7·97	3·15	6·32
Lime (CaO)...	9·97	9·00	7·50	12·01	7·63	10·29	8·34	5·96
Lime carbonate	11·25	11·13	15·11	8·86	15·80	8·63	16·70	20·95
Sand, grit, &c.	57·00	50·96	50·35	55·27	50·60	54·27	50·35	52·05
Earthy Matter	8·10	8·78	9·30	8·63	8·78	8·70	10·41	8·23
Iron oxide, alumina, and soluble silica	4·50	3·60	3·80	4·15	4·70	3·70	4·20	3·30
Commercial lime (CaO) of 80 per cent. to sand, grit, broken brick, &c., by volume	1 to 3·6	1 to 3·6	1 to 3·9	1 to 2·9	1 to 4·1	1 to 3·3	1 to 3·8	1 to 5·5
Commercial lime (CaO) of 80 per cent. to all other matters, by volume ...	1 to 5·5	1 to 5·6	1 to 6·9	1 to 4·4	1 to 7·2	1 to 5·0	1 to 6·7	1 to 9·4

TABLE VII.

Sample of Good Mortar taken from a Public Building in Course of Erection.

Moisture	17·84
Lime (CaO)	14·43
Lime carbonate	0·97
Sand, grit, &c.	59·15
Earthy matter	1·05
Iron oxide, alumina, and soluble silica	3·75

Commercial lime (of 80 per cent. CaO) to sand, grit, &c., by volume, 1 to 2·6.

Commercial lime (of 80 per cent. CaO) to all other matters (dry), 1 to 3·0.

In opening the discussion which followed the reading of the paper,—

Sir Charles A. Cameron said he was afraid he could not add anything to the very valuable information that had been laid before the Society by the authors of this paper. He occasionally had specimens of cement submitted to him which, although apparently having a correct composition —according to what was laid down in the text-books—nevertheless would not adhere to the sur-

face of bricks. As a matter of fact, disputes were constantly arising in connection with cement, mortar, and concrete, and there was a very large field open to workers in the direction of obtaining information which would enable such disputes to be settled on a scientific basis. In Ireland he did not think it was customary to use ground bricks in place of sand to such an extent as appeared to be the case in England. He believed the authors had mentioned the case of a mortar in which the proportion of lime to sand was as low as 1 : 9. He had himself once examined a sample containing almost as much sand, viz., 86 per cent.

Mr. Allen said that one problem which he had been called upon to solve was how much road-sweepings a particular sample of mortar contained, and what was the proportion of "clean, sharp sand." Road-sweepings seemed to be a very indefinite article, and he thought that if the authors could indicate how to ascertain the quantity present, it would be of great service to others as well as to himself. It seemed to him, if he had understood that part of the paper correctly, that it was a little questionable whether it was fair to deduce the amount of cement in a cement mortar from the amount of soluble silica. This surely must be a very variable quantity. There was no doubt that the Society was very much indebted to anyone bringing forward figures on such a difficult subject, as they would at least afford something like a basis for further investigations.

Mr. Bodmer remarked that where broken bricks were used in substitution for sand, the bye-laws, although providing for the proper grinding up of the bricks, did not specify distinctly that they should be well burnt. Badly-burnt bricks might be used, and in that case the amount of earthy matter present would be considerable. He thought it desirable that either the use of bricks should be altogether prohibited, or that some more definite limit should be laid down as to their employment.

The proportion of quicklime contained in the lime used was also a matter upon which disputes often arose, but it was hardly possible to suggest any definite standard, for in some kinds of lime which were really very good for mortar making the percentage of actual quicklime was comparatively low.

(To be continued.)

THE SANITARY INSTITUTE.

At an examination in Practical Sanitary Science, held in Leeds on June 10th and 11th, 1898, one candidate presented himself. At an examination for Sanitary Inspectors held in Leeds on June 10th and 11th, 1898, thirty-six candidates presented themselves. The following twenty candidates were certified, as regards their sanitary knowledge, competent to discharge the duties of Inspectors of Nuisances :—Edwin Ainley, John Robert Bell, Tom Biker, George Henry Canby, Edwin Carratt, James Coupe, James Samuel Cromack, Arthur George Dalziel, John Finn, Frederick William Girven, Joseph Jackson, William Thomas Jelfs, Henry King, John William King, Augustus Henry Merryman, Miss Lizzie Marguerite O'Kell, Robert Claybourn Schofield, George Scott, jun., George Siddall, and Alfred Wharfe.

"HALF-TIMERS."

Mr. Waddington, the retiring President of the National Union of Teachers, took for the subject of his address last Easter the question of half time, and exposed in no measured terms the hollowness of the pretexts put forward by its defenders, the conscious or unconscious spokesmen of the parents, whose selfish greed was, he maintained, the true motive and that on which the whole system rested. He showed how the Elementary Education Act required every child to attend school between the ages of five and fourteen years, a recent amending Act having abolished all fees for the period of compulsory attendance. But the Education Department had sanctioned bye-laws which overrode and defeated the intentions of the Act. In 70 per cent. of the school districts a child could obtain total exemption at the age of eleven by passing as low a standard as the fourth ; at twelve a boy might be made to work full time underground as a miner, though he was not allowed to pick coal above ground until a year later.

Only one-fourth of the children in our schools were over eleven years of age, half a million of the population between eleven and fourteen having left school just at the age when they were beginning to derive permanent benefit from the instruction they were receiving, but when what they had already learnt, if not impressed by continued training, rapidly faded from their memories. Of those who did remain 120,000 were half-timers, of whom more than half were in Lancashire, and fully three-fourths in that and the adjoining county of Yorkshire. As headmaster of St. James' National Schools, at Bolton, Mr. Waddington, spoke with the authority based on personal knowledge ; he denounced, as dishonest pretences, the various pleas put forward in extenuation of child labour, especially in the factory, the mill and the mine, as that it was necessary for the acquisition of manual dexterity, that it had either physically or intellectually any educational value, that the prosperity of the textile and other industries was bound up with it, and that the earnings of the children were necessary to keep the wolf from the door. Were, he asked, all the 66,508 half-timers in the schools of Lancashire the children of poor widows dependent on their scanty earnings of half a crown a week ? The employers, he maintained, were not to any considerable extent the supporters of child labour. It was the operative who wanted an eight hours day for himself who insisted on sending his children to the mill, or, if there were no room for them there, to work elsewhere, that he might reap the fruits of their toil ; the operatives of Burnley and Blackburn, continually on strike because of the unwholesome atmosphere of the mills, who condemned their little children to work under conditions they deemed, perhaps rightly, deleterious to their own health, and as the *Schoolmaster*, in an able report on the subject some two or three years ago, showed by quoting resolutions passed by the trades unions at different meetings, urged at one time the unhealthy conditions of the high temperature and humidity of the rooms as an argument for shorter hours for themselves, and at another maintained that factory work was conducive to the health and well-being of the young. But though the material side of the question was that alone with which

legislation could deal, there was also a social aspect on which Mr. Waddington, as a teacher, felt very strongly, viz., the entire withdrawal of the child from the influence of home and school. He did not suggest that there was a lower standard of morals among the great body of mill hands than among others in the same grade of society, but he did maintain that the tone, the moral atmosphere of the factory, was not conducive to the normal development of character in the young; the teacher found that half-timers had lost the fresh simplicity of childhood, they were no longer amenable to influence, but were precocious and bold, and had adopted the ways, the thoughts, and language of adults, and of those of by no means the most desirable class. The whole system was in his opinion "bad, barbarous, and an anachronism, without even the excuse of necessity."

From whatever standpoint we approach the question, whether on the physical, moral, social, or educational aspect, we heartily agree with every opinion expressed by Mr. Waddington, and must confess to a feeling of shame when we call to mind the position taken by the representatives of this country at the Berlin conference convened by the German Emperor, when Sir J. Gorst promised in good faith on behalf of England that the resolutions subscribed to by all the delegates present, except those of Italy and Spain, should be honestly carried out, and see now that while France, Switzerland, and others have been true to their word, and Germany has gone even further, England alone has as yet made no move towards the abolition of child labour.

SANITARY WATER ANALYSES.*

By FLOYD DAVIS.

(*Concluded from page* 598.)

THE CHEMICAL ANALYSIS.

A chemical analysis determines the present and past pollution of a water, and generally distinguishes between vegetable and animal matter, and, when the results are properly interpreted in the light of the sanitary survey, they often show whether a water is unsafe for drinking. Sanitary water analyses are usually reported in parts per million, so far as chemical results are concerned, because a litre of pure water at its maximum density contains exactly 1,000,000 milligrammes.

The total solids should not exceed 1000 parts per 1,000,000 parts of the water, because the use of such water overworks the kidneys in removing the waste products from the body. The best drinking waters contain usually not more than 500 or 600 parts of solid matter, which amount is nearly constant at all seasons of the year and in all parts of a distributing waterworks system; and it is not until this amount is exceeded that the water usually reveals the excess through the taste of its salts. Any decided variation from constancy in the amount of solids generally represents contamination and faulty management, and this is so marked in the water from "dead ends" that we sometimes find from thirty to forty times as much solid matter here as exists in the normal supply of the plant.

Loss on ignition, as determined by the refined methods adopted by some chemists, is not of especial interest to the sanitarian, since the principal value to be ascribed to this determination is from the qualitative indications of colour and odour evolved. A blackening of the residue indicates organic matter, which disappears somewhat in proportion to its instability, and, when it evolves little or no odour, the organic matter is probably of vegetable origin. But, when the odour is strong and disagreeable, the contamination is generally from animal sources, or is highly concentrated, and the water requires no further investigation to show that it is polluted and unfit for domestic use.

The chlorine in ground waters or in uncontaminated streams is generally small, and is constant at the same season in all parts of a distributing waterworks system; its amount should be nearly the same as that of the normal chlorine in other pure waters near by. Immediately after heavy rains, the amount is greatly reduced by dilution, and during a drought it is excessive, but is the same at all points in one locality. Any variation from constancy in the amount of this element should be studied with care, and its cause ascertained. Chlorine is in this way an important means of detecting sewage contamination, but it is of no aid whatever in detecting vegetable refuse.

In an investigation of a public water supply all tributary streams and rivulets should be examined; whenever marked variations in the chlorine occur, they are generally due to animal contamination, or to saline deposits near by. But the absence of this element, its small amount, or its constancy in a water, is absolutely no evidence that the water is pure and wholesome, because vegetable matter, which is practically free from it, may be there in any proportion, and thus render the water unfit for domestic use.

Free ammonia in water represents albuminous matter in a decomposing condition, and, when this is of vegetable origin, it is often noticeable, in Nesslerising for the free and albuminoid ammonia, that the colour is decidedly yellowish-green, instead of chocolate, and is especially distinct after the second or third fifty-cubic centimetre distillate. When the water contains urea, derived from urine, the organic matter is slowly decomposed, and the rate of distillation of the free and albuminoid ammonia becomes nearly constant after the first fifty cubic centimetres of each have been evolved; and a few of the last fractional distillates of albuminoid ammonia show nearly twice as much as the corresponding ones of the free. These facts are often of great service in detecting fresh sewage pollution. Surface waters suitable for drinking contain usually not more than ·050 part of free ammonia to 1,000,000 parts of water, and often much less when the albuminoid exceeds this limit.

Albuminoid ammonia is developed from undecomposed nitrogenous substances when under the influence of a boiling solution of alkaline permanganate, and therefore represents pollution in a fresh and possibly dangerous condition. When a large proportion of this is evolved in the first part of the distillation, the organic matter is very unstable and in a putrefactive state, and, whenever the total free ammonia exceeds the albuminoid, the water, if it be a surface one, is generally stagnant and insufficiently aërated, and a suspicion is always entertained of sewage contamination in an advanced decaying condition. Waters that contain

* *Engineering Magazine.*

less than ·050 part of albuminoid ammonia per 1,000,000 parts of water are organically nearly pure, and may generally be considered permissible, unless their origin is sufficient to condemn them; those that contain from ·050 to ·100 part are really dirty; while those that contain more than ·150 part of albuminoid ammonia should be condemned as unsafe for human consumption. In an investigation of a recent typhoid-fever epidemic at Duluth, Minnesota, where 2000 persons fell victims to the disease, the city water, which was its cause, contained only ·090 part of albuminoid ammonia per 1,000,000 parts of water. This one case shows how small an amount of albuminoid ammonia may be indicative of sewage pollution.

The oxygen consumed is generally in proportion to the carbon and hydrogen present in the organic matter of the water, and it often enables us to distinguish between vegetable and animal contamination. Permissible waters usually require not more than 1½ to 2 parts of oxygen per 1,000,000 to destroy their organic matter, and, when the amount exceeds 3½ or 4 parts, the water should be considered with suspicion. Whenever the amount of oxygen consumed is comparatively large and the albuminoid ammonia small, the contamination is usually of vegetable origin, and, when the oxygen is small and albuminoid ammonia large, the organic impurities are either of animal origin or concentrated albuminoids derived from vegetation.

Nitrites are compounds formed by the oxidation of ammonia in presence of weak bases, or are produced from nitrates through organic decay and bacterial action. They are very unstable salts, and frequently exist in cemetery drainage and badly-polluted surface waters. Any water having nitrites in measurable quantity should be regarded with suspicion, and many surface waters should be condemned by their presence alone.

Nitrates are the final products of oxidation of the nitrogen of organic matter, and therefore represent past pollution. Their normal amount in permissible water is generally very small, oftentimes not exceeding a mere trace, and their presence in a stream, or in the distributing system of a water works, in amounts above that of the original water supplying it, or the ground water near by, is evidence of contamination. This pollution is often due to faulty management in allowing suspended matter to accumulate in the mains; all "dead ends" should be flushed at frequent intervals.

THE MICROSCOPICAL EXAMINATION.

Under the microscope the suspended matter which separates from a water upon standing, like silt and other substances which might irritate the intestinal tract, can be studied with precision, and the results are often of great value in determining its sanitary quality. The writer has detected, in wells and streams used for domestic supply, particles of hair, excreta, oil globules, epithelia, and other filth derived from surface drainage or sewage, such as decaying vegetation, and it requires no argument to show that all such water is loathsome and unfit for domestic purposes. The microscope also enables us to study algæ and the animal micro-organisms of water, such as paramecia and other sewage ciliata which have been traced directly from the source of contamination to the point of supply; and we thus judge of the character of the water by knowing the habitat of these micro-organisms. The various entomostraca, such as cyclops and daphnia, can also be best studied with the microscope, although they can be easily seen with the naked eye. These organisms were once held as indicative of purity, but they are also found in water contaminated with drainage, and we now know that their presence has no significance.

THE BACTERIOLOGICAL EXAMINATION.

Bacteriology offers considerable service in the study of a water supply, by determining the number of micro-organisms in a given volume of it. This science is particularly valuable in ascertaining the efficiency of filtration, and it also sheds some light on nearly all natural waters. Those from exceptionally pure sources, such as springs, deep wells, and rain or snow that falls at the end of storms, have but few bacteria in them, and the best ground and surface waters usually contain no more than 200 or 300 per cubic centimetre. The number of micro-organisms generally increases with pollution, until sewage is reached, with its millions per unit volume; and, when there is a large number of sewage bacteria, it is probable that pathogenic germs are among the lot.

Since bacteria are absorbed from the air, the best surface waters must contain them, and no fixed standard of permissible limit is given. The number of micro-organisms depends entirely upon local conditions, always being more in thickly-populated districts than in mountainous and uninhabited regions. But some eminent authorities hold that a drinking water should not contain more than 1000 germs per cubic centimetre, and the Sanitary Authorities of some large cities, having municipal waterworks, advise the inhabitants to boil the water whenever the number of bacteria in it exceeds this limit. Systematic tests are frequently made to ascertain efficiency of filtration by determining the number of micro-organisms in the unfiltered and effluent waters; and mechanical filters are now operated so perfectly by the use of alum cake as a coagulant, that from 97 to 98 per cent. of the bacteria are removed. Some filter companies now guarantee to remove 96 per cent. of the micro-organisms, and reduce the albuminoid ammonia at least to ·150 part per 1,000,000 parts of the water, and any system of purification that falls short of these results is unsatisfactory in proportion to the degree of failure.

Some investigators attempt to determine the wholesomeness of water by searching for its pathogenic germs, while others inoculate guinea pigs and rabbits with a culture medium which has been impregnated with the water and kept at the temperature of the human body for some time, and then study the effect with a hope that, if the water is disease-producing, physiological symptoms will develope characteristic of disease. But the numerous and tedious operations required for the identification of any species of bacteria, and the improbability of finding it, render the search almost hopeless at the beginning and usually fruitless in the end. This is not strange when it is remembered that only a few drops of water are operated on at a time. No polluted water, or even sewage, is teeming with disease-producing germs, and they can be expected only in very inconsiderable numbers compared with those of other bacteria present.

There are but few cases on record where the Eberth bacillus has been satisfactorily isolated from

water supplies, and it is doubtful whether there has been a case on the American continent. The resemblance of this bacillus to certain water bacteria has often confused inexperienced investigators, and some bacteriologists distrust even their own results, and change their views after the "test of experience" has been made. But we can detect with certainty the *Bacillus coli-communis*, which is a normal inhabitant of the intestines of man and some other animals, and its presence is sufficient to absolutely condemn a water which contains it, in the absence of a system of thorough purification.

DETECTING ORIGIN OF POLLUTION.

It is sometimes desirable to determine the origin of pollution of a water supply. This is done by introducing into the various suspected sources some foreign substance that can be readily detected in the water, and yet will be harmless if taken into the system in small quantity with the water. By comparing the chlorine of city wells before, with the excess found some days after, a large amount of common salt and water has been added to adjacent privy vaults, serious contamination is often detected. The celebrated case of contamination of the Lausen (Switzerland) water supply was detected by placing a large amount of common salt in the suspected polluting stream, about a mile distant, on the opposite side of the Stockhalden, after which it appeared in the spring at the base of the mountain that furnished some of the inhabitants of the town with water. Lithium chloride, which is detected spectroscopically in minute traces, is sometimes used for the same purpose, and has given great satisfaction in legal investigations. The use of fluorescene, which gives a magnificent yellowish-green fluorescence to water, even in the smallest quantity, demonstrated an underground connection between the rivers Danube and Ach; and in the investigation at Duluth, above referred to, sodium fluorescene placed in a sewer appeared at the end of the intake, at a distance of several hundred feet from the shores of Lake Superior, in four and a-half hours, and remained for forty-two hours, thus showing, in the most satisfactory manner, the sewage contamination of the city water supply. Aniline red, aniline blue, and in some cases even Prussian blue have given satisfactory results in detecting the origin of pollution. Whenever any of these substances demonstrates a connection between a water supply and sewers, privy vaults, or other sources of contamination, the water cannot be used with safety for drinking, except after boiling or sanitary filtration.

CHELSEA.—At a recent meeting of the Vestry the Medical Officer of Health, reporting upon the smoke nuisance in the parish, recommended that notices be prepared, stating that in the opinion of the Vestry it is necessary that all furnaces used for generating steam which are, or may be, within the parish boundaries, should be so constructed as to consume the smoke arising from any combustible that may be used therein, and that such notices be forwarded to the various persons concerned, together with an intimation that in future a strike in the Welsh coal trade, and a deficient supply of smokeless coal, will not be accepted as an excuse for the infringement of the smoke provisions of the Public Health Act. It was resolved that the report of Dr. Parkes be approved.

SANITATION OF COUNTRY HOUSES, VILLAGES, AND SMALL AREAS.*

By EDWARD TIDMAN, C.E., F.S.I.

(*Continued from page* 618.)

ANOTHER process of treatment is the "Alumino-ferric," which is applied in the form of solid slabs or in solution; by the latter process an automatic appliance is provided for dissolving the slabs as required. After treatment, the precipitate formed is allowed to settle in tanks varied in capacity to suit the volume of sewage to be treated. The automatic supply can be fitted to existing tanks, and the working expenses are nominal, the cost of the charges being about £3 per ton, and the quantity required averaging 12 tons per 1000 population per annum, so that the cost per head in a mansion would be small if properly managed.

The treatment of sewage by works provided for bacteria cultivation has now for some time caused considerable attention to be paid to the bacteria treatment, and although this treatment is by no means yet the "active agent" in the purification, was not properly credited with the good work done by it in removing solids from sewage. The author, some thirty years ago, constructed a sewage outfall treatment for a small town in the North of England, where gas coke was used for the filtration, and with excellent results—so much so that at no time since has any complaint been made of the outfall effluent, although it runs direct from the tanks into a tidal brook, and eventually into a tidal river, close to a town of some 60,000 inhabitants, but he was not then aware that the bacteria were his friend in assisting to secure this good result.

It is of course well known now that the purification that takes place in sewage by passing it through land or artificial filters is mainly due to the transformation of the complex organic matters in the sewage into more simple and harmless forms, not liable to putrefaction, and therefore causing no nuisance.

Until very recent years it was always usual to lay down in any scheme of sewage treatment settling or subsiding tanks, into which the sediment would be deposited, and afterwards removed in a foul and offensive condition and at great cost, and before the liquid was run on to land. But it has now been found that crude sewage can be satisfactorily purified by the bacterial organisms without any previous treatment whatever, either chemically or by subsidence, thus obviating much of the expense and nuisance always attached to such treatment.

The bacteria which affect this change are present in crude sewage in enormous numbers, and by proper care their work and numbers can be increased to an unlimited extent; but proper treatment is necessary for such delicate organisms as bacteria are, and their natural and suitable surroundings provided for, or they will be killed and their utility crippled in a more or less degree, and the result prove unsatisfactory.

The failures in many expensive sewage outfall schemes are no doubt due to the want of consideration of these requirements, or the want of knowledge

* Paper read at the Northamptonshire and Adjoining Counties Branch of the Sanitary Inspectors' Association, at Northampton Town Hall, May 21st, 1898.

by those in charge, and no system of sewage disposal will be efficient or remain efficient without proper care and attention, and the provision of a competent and capable official to attend to the working and management of sewage schemes is a *sine quâ non*, if satisfactory results are to be obtained; and no doubt the best results are secured if Local Authorities keep the management of their sewage disposal in their own hands and control, as the self-interest of tenants frequently ends in failure as regards sewage purification.

It is only within the last few years that it has been ascertained that two different classes of bacteria can be utilised for sewage purification; one class consisting of bacteria that require the presence of air, or, at any rate, "oxygen," for completing or carrying on of their processes. These are known as "aërobic" bacteria, whilst the other class consists of bacteria which flourish best in media from which air and light are as far as possible excluded, and are known as "anaërobic" organisms.

The value of the latter class in sewage purification has only recently been recognised; they act on both nitrogenous and carbonaceous organic matters in suspension, part of which is resolved into similar constituents, whilst the larger proportion is liquefied or rendered soluble, and therefore more easily acted upon by aërobic bacteria. It is these anaërobic bacteria which are made use of in the patent septic tank, which for some time has been working at Exeter, and which will be described later on.

Sutton, in Surrey (population about 16,000), has been using bacteria filters with excellent results. Mr. Dibdin, the late chemist to the London County Council, having experimented elsewhere, induced the Urban District Council to give the bacteria cultivation filter a trial. Two of these filters, capable of dealing with about 30,000 gallons of sewage per day, were constructed late in 1896; the filtering materials being burnt ballast (or clay burnt on the ground, at a cost of about 2s. 3d. per cubic yard), and the crude sewage being run on to the first filter without any treatment beyond passing through two roughing screens.

The following is a description of the first or rough bacteria filter:—It has a superficial area of about 183 yards, and a depth of about 5ft., and its capacity is about 218 cubic yards, and it holds, when full, 36,000 gallons; and when filled with burnt ballast, 13,500 gallons, or rather more than one-third sewage to two-thirds ballast. The sewage is applied at about the rate of 180 gallons of superficial yard of filter, which is equal to nearly 900,000 per acre of filter area per day. At the bottom of the filter is a 6in. drain, from which 3in. drains radiate to the walls at intervals. The ballast which is used as the filtering material is, after burning, screened through a half mesh, and all that passes through is discarded, the remainder only being used in the filter, the larger pieces at the bottom and the smaller in the middle, and the top is composed of yet coarser pieces. The raw sewage passes directly on to the top of the first filter, which it takes about three-quarters of an hour to fill, care being taken that the sewage, when the tank is filled, does not rise above the top of the filtering material. The sewage is allowed to stand in the filter in contact with the ballast, and subject to the action of the bacteria for at least two hours, after which the valve at the bottom of the filter is slowly opened and the effluent run on to the second filter, which is placed at a lower level.

The second filter is constructed much on the same lines as the above, only that the filtering medium is much finer. The effluent in the first tank is allowed to stand in the second tank after the filling is complete for two hours, after which time the tank is slowly emptied by means of a valve at the bottom.

The effluent from the first tank, though not free from smell, is fairly clear, and almost free from suspended matters of the crude sewage, and also a considerable portion of the dissolved organic matter having been removed, while the effluent from the second tank is invariably, it is stated, clear, colourless, free from smell, and not liable to subsequent putrefaction, and fit to be discharged into any watercourse.

The construction and the management of the filters have been under careful supervision. The effluent has been periodically analysed and examined, and the results, as published, are most satisfactory.

The time taken from the commencement of the filling of the first filter is about six hours, and by the holding up of the sewage in the tanks, and subsequently drawing it off from below, aëration of the filters must occur, as air must be drawn in from above to take the place of the liquid that is withdrawn. The filters should rest for two hours after they have been emptied, so as to permit of thorough aëration and revitalisation, and they are also allowed complete rest for twelve out of every twenty-four hours.

The action of the filters is essentially a biological one, and the full bacterial action is not fully established, until the filters have been in action for several weeks, as the bacteria have to establish themselves and multiply in the filtering medium, and it is especially during this period that care is necessary in the management of the filters.

The author has constructed several filters on this principle for country houses, and the cost is very small. In one case, where there is a school with a population of about eighty inmates, the cost of the tanks was about £50 only, and the attention is limited to an assistant gardener altering the valves once in twenty-four hours and cleansing the roughing screens, taking about one hour only daily, therefore the working expenses are very small.

The filtering material need not be burnt ballast. Clinker, scoriæ, or slag will be equally efficient for the first filters, and gas coke or fine gravel can be used in the second filters. There are no patent rights attached to this system of sewage disposal, and in the matter of cost it must contrast favourably with any other system, where patent rights or royalties are involved.

The Ducat filter, as erected at Hendon, is a bacterial filter, but the construction differs from that described above, inasmuch that the walls are constructed of agricultural field pipes, with an inclination downwards and inwards, with the object of allowing free access of air to all parts of the tank, and to ensure the passage of air into the interior of the filter. A layer of aërating pipes are also laid horizontally through the filtering material at intervals of 18in.

THE SEPTIC TANK SYSTEM.

The chief feature of this system is the passing of the crude sewage through one or more long tanks, from which air and light are, as far as pos-

sible, excluded, prior to treating it on bacterial filters, as previously described, the sewage remaining in the septic tank about twenty-four hours; it enters and leaves the tank below the water-line, so as to cause as little disturbance as possible, and has grit chambers, which remove part of the mineral matter. Within the septic tank a scum is speedily formed, and the action of the tank appears largely to depend upon the presence of this scum; the changes in the sewage within the septic tank are the result of fermentative action, brought about mostly by anaërobic or liquefying bacteria, and consist in the removal of about 55 per cent. of the suspended matter, and 30 per cent. of the oxidisable organic matter; while the free and albuminoid ammonia are also reduced, and the condition of the remaining organic matter is changed, so that it is more easily broken up by subsequent bacterial action in the filters. Marsh and other gases are given off, and there is little odour present; about one-eighth of the usual deposit is left in the septic tank. The effluent is somewhat turbid and discoloured, and it is further necessary to aërate the effluent by passing it over the edges of an aërator in thin sheets, in order that it may take up oxygen, and is then conducted on to the filter beds, composed of crushed clinker and coke breeze, and eventually a high degree of purity is attained.

GARFIELD COAL FILTERS.

The Garfield coal filters are at work at Wolverhampton, Lichfield, and Tipton, and are spoken highly of by Dr. Reid, M.O.H., Stafford County Council, but the author has had no experience of their action. This filter is composed of coal of various degrees of fineness, and is allowed to rest for twelve out of every twenty-four hours; the top layer of coal being well washed before use.

Until the last few months the author has generally treated mansions and small installations of sewage treatment through settling tanks, and after thoroughly removing the solids run the liquid through subsoil drains under meadows or kitchen gardens, where the fall would permit, and by this means a practically pure effluent is obtained, and the growing crops over are much improved; but keeping the settling tanks cleaned out seems always a difficulty in country houses, but since the introduction of the bacteria tanks—and their success has been proved — he finds that their automatic action in removing the solids from the crude sewage, and by the subsequent treatment of the effluent by subsoil irrigation, there is no system that answers so well and efficiently, as regards initial cost, working expenses, and purity of the effluent, as the bacteria tank system.

For much of the information contained herein with regard to sewage treatment, the author is indebted to the inventors of the various systems, to the Surveyors in the districts where the works are situate, and last, but not least, to Dr. T. Eustace Hill and James Robinson's report on "Sewage Disposal to the County Council of Durham," and many thanks are due to them for their courtesy and assistance.

Having now dealt somewhat fully with the outfall into cesspools, and treatment on land, and by precipitation in tanks, &c., a few words about the discharge of sewage into the sea, which is the ultimate end of all sewage purified or not. In draining into the sea, care should be taken to fix the outfall sufficiently into deep water to render pollution of the banks impossible; to prevent the tidal water getting back into the drains; to provide sufficient capacity for the water impounded during flowing tide, and for the special ventilation of the drains when tide locked.

The subject treated upon in this paper would not be complete without some reference to the midden, privy, pail, and other dry or semi-dry system in use. There can be no doubt the old midden and privy system spread filth. Diseases, cholera, and enteric fever, and diarrhœal complaints are increased by it. The wells are polluted, the air fouled, and in many other ways it is objectionable. These may be lessened by their being made water-tight, frequently cleansed, and with movable receptacles; one of the best being that known as the "pail system," where the excreta is caught in pails or tubs containing absorbent deodorising material, and frequently emptied and treated with sulphuric acid, say, 30 lb. to the ton.

"Moule's" dry closet system may be adopted in some cases with advantage in out-buildings of mansions, in villages, and public buildings. The objection to this system is the trouble of providing dry earth, the expense of cartage, the offence to the sight, difficulty of securing proper attention to the working, small value of residual manure, and its excreta being frequently placed too near the houses.

It is, however, cheaper than water-closets, requires less repair, is not injured by frost, reduces the quantity of water required per head (an important advantage in some districts).

And now, in conclusion, the author must express his regret at the dryness of the subject, and probably handled with little novelty to many of you, who have frequent opportunities of hearing the subject treated by the various learned societies more closely allied to the engineering department of the profession than ours; yet it must be remembered that the Association has many members scattered over the Empire and Colonies who may find useful help from its perusal, and to such as only read our *Journal*, there may be more novelty and information than to those here to-day, who have given such patient attention, and it is hoped that the discussion to follow will add information useful alike to his audience and the author.

An interesting discussion ensued, and a vote of thanks was passed to Mr. Tidman.

ESHER AND THE DITTONS.—It has been decided that a committee be formed whose duty it shall be to report on the administration of all working-class dwellings in the possession of the Council, and to submit plans and estimates to the Council should it be desired to acquire additional working-class dwellings, such plans and estimates not to involve any charge upon the rates. At the meeting of the Council, where this decision was made, there was considerable discussion as to the scope of the reference, but Mr. Greening put the matter right by explaining that he wanted a committee solely for the purpose of gathering information about the cost, erection, and plans, &c., of working-class houses, should the Council at any time decide to erect or take over any such houses.

MUNICIPAL ENGINEERS AT NORWICH AND YARMOUTH.

In continuation of our report on page 647 in our last week's issue, we have to note that on Saturday morning, the 18th inst., the members left Norwich at 9 a.m. by boat, generously provided by Messrs. Collins and Cockrill, and proceeded down the rivers Wensuon and Yare to Brundoll, whence they took train for Yarmouth. A meeting was held in the Town Hall, Yarmouth, at 12.30 (noon), the members being welcomed by Mr. Burton, chairman of the Sanitary Committee of the Corporation (in the unavoidable absence of the Mayor), luncheon being also kindly provided by the Mayor for the members. The chair was occupied by Mr. J. T. Eayrs (past president). The following paper on "Some of the Recent Works Carried Out by the Great Yarmouth Town Council," was read by Mr. J. W. Cockrill, Borough Surveyor.

It is now twelve years since the author had the pleasure of welcoming the members of the Association to this town. The meeting then held is reported in our "Proceedings," vol. xii., pages 119 to 154.

Sewers.—The work of re-laying the whole system referred to in the former paper has stood well, and the purpose for which it was undertaken has been fully realised, for out of nearly one hundred miles of sewer under the author's charge, there is not one mile but which is absolutely self-cleansing, and in a town so flat as Yarmouth this may be considered satisfactory. The works of flushing, to be spoken of hereafter, have much to do with this. Since 1886 many extensions have been made to the sewerage works. New pumping stations on the main sewer outfalls, to prevent the tide-locking of the sewers, have been erected, and flood-prevention works have been carried out, the cost of which in the aggregate has been about £25,000. These works comprise about one mile of 5ft. egg-shaped and 1¼ mile of 3ft. egg-shaped sewer, built in concrete with a salt-glazed tile facing—the cost was remarkably low; a sample piece has been set up for your inspection at the depôt. The 5ft. sewer cost 33s. per yard run, and the 3ft. sewer 20s. per yard run without digging. The glazed surface keeps itself clean, and can very easily be swept down. The low cost is due to the very great facilities we have for making concrete, the clean shingle being delivered on the works, ready for use, at 1s. 3d. per yard cube. These sewers were put in to prevent the flooding of some of the low-lying districts, which were found to be flooded in very heavy rains and thunderstorms. The pumping stations which have been erected are placed across the two largest sewers we have near the outfalls, and the man in charge pumps whenever the accumulation of sewage reaches the height which would mean tide-locking the connections into the main sewer. The pumps at the larger station to be inspected are Gwynne's centrifugal 15in. and 24in., driven by Otto gas engines of 14 and 20-horse power. They are capable, with their lift averaging 6ft., of raising quite a million gallons per hour. At the second station two 12in. centrifugal pumps are put in; the benefit derived from these installations is very great, as not only is the tide-locking of the sewers prevented throughout the year, but in the winter time, when a strong north-west wind is blowing, the tide holds up the river three and four days at a time to such a height that no sewage can pass out by gravitation.

Sea-water works.—These were completed on the lines which were described in the former paper; but the success of the undertaking on all points was so marked that the Committee determined very soon to extend the works, and instead of the £4500 which the original works cost, more than £10,000 has now been spent. The saving to the Corporation is very great, as the following figures will show. The cost, including repayments of capital, interest, and all working expenses, has been about £600 per annum during the last few years since the extensions, and for this quite 100 million gallons of water have been raised to a height of 45ft. and distributed over the town, or at a cost of less than 1½d. per 1000 gallons. The street watering takes about seven million gallons, and sewer flushing the remainder. The water is supplied free to most of the Elementary and Board Schools in the town for flushing closets, urinals, drains, &c., some fourteen houses also have it laid on for baths and drain flushing.

Flushing is carried out by some twenty-five automatic flushing tanks, varying in capacity from 3000 to 1000 gallons, and with outfalls of from 9in. to 15in. diameter, besides about 250 flushing valves, varying from 6in. to 3in. diameter, according to the size of the sewer to be flushed; but I have found that 3in. and 4in. pipes with delivery direct into the sewers will provide sufficient flush for 9in. pipes, and that sewers up to 15in. diameter can be kept clean with the larger sized valves. The saving in the roadwork is very considerable; the sea water has a most beneficial effect on light roads made with gravel or flint. No damage is done on the heavier granite macadam, but a greater amount of cleaning is required in the autumn. The saving on the light roads by the use of sea water, in my opinion, is quite £500 per annum, spread over about twenty-five miles. In addition to the saving caused by the water costing only 1½d. per 1000 gallons instead of 1s., there is from two to three million gallons less used than there would be if fresh water were employed. The saving in horse hire in distributing is quite £250 per annum, and the work is much more effectually done. A less number of complaints are received at the author's office now in a whole season than in a week during the time fresh water was used.

Previous to its introduction the chemists employed by the Water Company prophesied all sorts of evils as the result of using it for sewer flushing, which have not come to pass. Its use has been most effectual in preventing nuisances from sewer gas, as not only is there the mechanical action of the flush, which scours the sewers out, but there is the change of air in the sewers caused by the large rush of water, and as there are few sewers in the town but are flushed every other day, this is a very important factor in ventilating and changing the air in them. In the sewerage of the Old Rows, of which there are 145, averaging about 150 yards in length and less than two yards wide, which have been recently sewered, each sewer has its own flushing valve at its head, and is by this means kept perfectly clean. The length of water mains laid in the streets is now 13 miles, of sizes varying from 8in. to 3in. diameter. All members of this Association will appreciate the advantage of having com-

plete works of water supply for sewer flushing under their own control, and the convenience of being able to flush without fear of interfering with the domestic supply of the town. The author has in his case the sea to draw from, which is salt, and there are many advantages in using salt water; but there are few towns in which a supply of water exists of not sufficient purity for drinking purposes, yet clean enough for street watering or sewer flushing, which could be made available.

The concrete footways have been considerably extended since the last visit of the Association. During the sixteen years which the author has been responsible for the work of this town he has laid some forty to fifty miles. The facilities for obtaining materials are very great, and shingle ready for the work, entirely free of sand, is delivered in the streets at 1s. 3d. and 1s. 6d. per yard cube. This permits the path, 3in. thick, to be laid at a cost of 2s. to 2s. 2d. per yard superficial by the Corporation staff. Contracts, however, have been let and completed at from 1s. 8d. to 1s. 9d. per yard superficial.

Destructor.—The growing difficulty of disposing of town rubbish has for some years been apparent in this town, and although recreation and pleasure grounds have been formed with this material during the last ten years—the author has laid down 32 acres of this class of ground on sandy waste land, similar to and partly on our beach—the cost and upkeep of these grounds prevent too great an extension, and the Town Council have reached a point beyond which they cannot go at present. It thus became necessary to decide on some other course. Great difficulty has been experienced for years in getting the farmers of the neighbourhood to take it, and when they did the sorting and selection created great nuisances; and, as these farmers would only cart it away at times convenient to themselves, it caused an accumulation on the quay, used for deposit about a mile out of the town, of a heap frequently of 5000 to 10,000 tons. The author was instructed to consider the question of the desirability of conveying and tipping out at sea or of burning. On the first point he found that the cost of plant, with its attendant items of interest and sinking fund, the cost of upkeep and towage, with the certainty that in the most favourable winter there would be times when for three or four days it would be impossible to take the hopper barges over the bar, made it as costly as any mode of burning, and the uncertainty was a great drawback, as it involved keeping plant which would depreciate quickly, and for which the quay space was very limited.

The next point raising any controversy was the site. At the present depôt the Town Council had a splendid site with good foundations, a railway close by, the engineer for which was prepared to take the whole of the clinker and pay for it, but as the site adjoined the isolation hospital, and was within 100 yards of the workhouse, the Local Government Board refused its consent. The remainder of the land in the neighbourhood being Corporation estate, which is fast being developed for better-class dwellings, it was felt desirable not to do anything which, if only in a sentimental sense, might depreciate this estate. It was determined to erect the destructor on its present site, the foundations of which are very bad; the river Bure adjoins it on the west, and the mean level of the water in the same is above the level of the marsh; the soil is for the first foot or two vegetable mould, then there is about 2ft. of sand which is full of water, and then for nearly 20ft. a soft alluvial deposit, locally known as ooze. The utmost bearing capabilities of the soil about 6in. from the top after removing the sod, was by experiment found to be 10 cwt. per foot superficial; the bearing capabilities of the ooze not being more than half this. At the depth of 22ft. is found a bed of good sand and gravel, and borings on the site show this to be at least 15ft. thick. The author's previous experience in this soil has shown that a large quantity of water is to be met with at a point about 5ft. above the sand level, and the knowledge of this has led to the method of carrying out the foundation work hereinafter described. The very poor quality of the refuse of the town, which contains a large percentage of sand with the contents of some 3000 privies, will give poor calorific results; and the present installation only provides for fixing an 80-horse power boiler, the steam from which will be used for fans, for forced draught, a dynamo from which light will be obtained for the works, and motors for sewerage lifting at a station near by. The number of cells to be fixed at first is ten of Manlove, Alliott, and Co.'s latest type, but the building provides for four additional cells, making fourteen in all; or two cells can be put in with Babcock and Wilcox boilers between them and the end of the present ten cells, so that each boiler could be heated by two cells should any work be found for the steam. The cells are to be fitted with Boulnois' patent charging apparatus, and the furnaces with Messrs. Manlove's clinker furnace.

The chimney is to be 200ft. high, starts square at the base, is octagonal for 50ft., and then goes up circular; inside it is a parallel tube 6ft. in diameter with fire-brick lining the whole height, and kept at least 4in. from the outside shaft; for half its height it is 13½in. thick, and for the remainder 9in. thick. The chimney stands in a very exposed position, and the top is kept plain with very little overhang. The exposed position of this building, and the rather unusual practice of having a tipping platform on both sides of the cells, which involved a very wide span for the roof, led the author to form a level roof in concrete; the cost working out less than it would have done if covered with a slate roof with the usual pitch, besides which the weight is more equally distributed, and the wind forces exerted upon it are very small. The tipping floor and roof of the engine-room, which forms the summit of the inclined approach, are formed with trough flooring, covered with granite setts, paved on concrete with asphalt joints and bed. The foundations, which are now in progress, for the chimney and main buildings are to be on cylinders. The chimney weighs 2300 tons, is to stand on sixteen cylinders, each 6ft. 6in. diameter, and gives a weight, including the cylinder, of 4 tons 6¾ cwt. per foot superficial on the bed of sand and gravel.

The main building is to stand on twenty-six cylinders of 5ft. 6in. diameter, and gives an average of about 3 tons 5 cwt. per foot superficial on the soil. The cylinders are constructed of concrete blocks 9in. thick, built in the ordinary way. At first it was intended to have built them in brick, but the author found that he could make the concrete blocks cheaper, and build the cylinders quicker

with them than with brick, which would have had to be specially made. The blocks are 9in. thick, 9in. high, 15in. long on the face; the lower 4ft. is encased in a wooden drum with a cutting edge, and sunk into the gravel and sand about 2ft.

Until the main spring of water is met with the cylinders will be sunk by men filling buckets in the ordinary way, but rather than pump large quantities of water—which would have the effect of disturbing the adjoining cylinder—the work of sinking will be carried on by a circular grab now being made by Messrs. Priestman, of Hull. For the work of levelling the soil at the bottom and placing the two courses of concrete blocks a diver will be employed. The joints of the concrete blocks are to be grouted up with liquid cement, which will be passed into the joints through a 3in. pipe; this will be allowed to stand three or four days to set, when the cylinders may be expected to be watertight; the water will then be pumped out and the cylinders filled with concrete. Such is the method in which the author is proposing to form the foundations, but as the work is being carried out without the aid of a contractor it is subject to such alterations as may be found expedient and likely to give a satisfactory result. It is hoped that before the members meet a cylinder or two may be sunk to the required depth; at the time of writing the only thing likely to hinder this is the delivery of the plant. The foundations of the engine-room, which is only one storey high, are spread, so that no portion has a greater weight than half a ton per foot superficial on the same.

Isolation Hospital.—The town is well provided in this respect. The cholera scare of some few years ago led to the provision of a rough temporary building near the harbour's mouth, and its being kept permanently ready for such an emergency. In addition, about 1½ mile into the country, a group of wooden and corrugated iron buildings have been erected for small-pox; these are somewhat extensive, and although they have now been erected some five years they have not been used. They consist of two pavilions capable of accommodating fourteen beds each, a receiving ward for three beds, with nurses' room and kitchen, an administrative block, and a laundry block. It stands on a good open high site in the country, and if it should be unfortunately needed will serve effectually to isolate, without any addition, at least thirty patients, while temporary provision could be made inside the ground for twice as many more.

The isolation hospital for fever cases is a permanent erection, the nucleus being erected four years ago, consisting of an administrative block, two small blocks, with male and female wards on each side of a nurses' duty-room. A large double-ward block similar in plan, and a block for laundry and disinfecting purposes, which also include ambulance store, mortuary, and receiving and discharging-rooms for patients, with store for their clothing. The extensions now being made consist of eight bedrooms to the administrative block, a large double-ward block of the usual plan, and, what is perhaps a rather unusual feature, a convalescent block for scarlet-fever patients; this consists of a day-room, two dormitories, two nurses' rooms, bath-room, and usual offices.

The author described the work executed and in progress for the recreation grounds and beach gardens, the old jetty, rifle butts, and accommodation for Volunteer encampments, and fish wharf quay wall.

Electric lighting.—As early as 1886 the author had been instructed to, and he had reported upon, the desirability of introducing the electric light into the borough, and in 1890 the Town Council obtained a Provisional Order, which they commenced to carry out in 1894; Mr. W. H. Preece, C.B., F.R.S., being appointed consulting engineer. The cost of the first portion of the installation was £15,000, but the demand for the light has been so great that at the present time the capital expended amounts to £33,000, and leave for fresh loans is asked from the Local Government Board, which will make the capital expenditure £40,000. The increase of the demand is shown in the fact that the lamps installed on April 1st, 1895, were 1600; in 1896, 5900; in 1897, 8600; and in 1898, 11,000. Up to the present the works have not paid full charges of interest and sinking fund, there being about £700 deficiency during each of the first two years, and £400 deficiency last year. The rate of progress in connecting additional lights shows that a profit may soon be expected. Last year the earnings on the capital expended was 4⅞ per cent., and if the Local Government Board would allow longer periods for the repayment of the loans these works would have paid their way from the first.

After the reading of the paper, a discussion followed, and votes of thanks were accorded to Mr. Cockrill, and also to the Mayor and Corporation for their hospitality.

Subsequently the members were driven round the district to view the numerous interesting works in progress by the Corporation.

NATIONAL REGISTRATION OF PLUMBERS.

PROVOST GLOVER presided at the annual public meeting of the District Council for Dumfries, Kirkcudbright, and Wigtown, in connection with the National Registration of Plumbers, at the Town Hall, Dumfries, on Saturday last.

In moving the adoption of the report, he said that the public themselves were perfectly satisfied as to the dangers of bad plumbing, and had been so thoroughly aroused that they had sought to arouse the plumbers, and it was to be hoped, after the attention the matter had received, on public and sanitary grounds, that the plumbers themselves would respond to the appeal that had been made to them to make sure that they entered into a proper appreciation of their duties as tradesmen, and that nothing but thoroughly good work was carried out.

The Town Clerk, Mr. John Grierson, moved a resolution that the Council petition Parliament in favour of the Plumbers' Registration Bill. He said that the Bill had been supported by large majorities in several divisions in the House of Commons. Even the opponents of the measure were practically one as to its aims and objects. The resolution was seconded by Bailie Hanlon, and carried.

It was announced that the next Congress of District Councils in Scotland would be held in Glasgow on the 18th, 19th, and 20th of August next, and in connection with it what is expected to be by far the largest and finest exhibition of plumbers' work that has yet been held.

Sanitary Inspectors' Associations.

NORTH-WESTERN AND MIDLAND.

THE inaugural meeting of the Midland District Centre was held on Saturday, June 11th, at the Council House, Birmingham. There were present representatives from West Bromwich, Bilston, Wednesbury, Stafford, Seisdon, Sedgeley, Uttoxeter, Birmingham, Coventry, &c. Mr. William Bland (Barton), who was in attendance on behalf of the Central Executive Council, took the chair at the commencement of the proceedings.

Resolutions passed at a meeting of Midland members, held at Stafford on March 26th, and at a special meeting of the Association, held on April 16th, having been read, it was unanimously resolved, on the motion of Mr. W. H. CONEY (Wednesbury), seconded by Mr. J. LOWRY (Seisdon), that the resolutions passed at the meetings referred to be endorsed, and that a Midland District Centre be formed.

The following officers were then appointed :—President of centre, Dr. George Reid, M.D., D.P.H., County Medical Officer Staffs. C.C.; district chairman, Mr. F. T. Poulson, Staffs. C.C.; Hon. Secretary, Mr. J. H. Carter, Sanitary Inspector, Council House, Birmingham. District Council: Messrs. Jas. Beech, Wolstanton; W. H. Clarke, Coventry; F. A. Faber, Birmingham; A. Hodges, Handsworth; E. W. Jones, Birmingham; A. Kent, Hanley; J. Lowry, Seisdon; E. G. Spears, Birmingham; R. Thornton, Fenton; H. Walker, Bilston; and T. Waters, West Bromwich. Scrutineers: Messrs. W. H. Coney, Wednesbury, and F. Thomson, Birmingham.

It was unanimously resolved that meetings be held on the last Saturday in each month.

The President (Dr. Geo. Reid) will deliver an inaugural address on Saturday next, June 25th, when the attendance of all Sanitary Inspectors in the Midland district is invited. This meeting will be held in the Council House, Birmingham, and will commence at 4 p.m.

The first annual meeting of the North Wales District Centre was held at Bethesda on Saturday last, the 18th inst. There was a large attendance of members present. The order from the Central Association constituting the District Centre having been read, the election of officers was then proceeded with, the following gentlemen being elected to the several offices mentioned :—President, Dr. P. Fraser, M.B., B.Sc., Medical Officer of Health Carnarvonshire Combined Sanitary Districts; Chairman, Mr. Ernest Worrall, Penmaenmawr; Vice-Chairman, Mr. W. H. Worrall, Bangor; Treasurer, Mr. Wm. Little, Llandudno; Hon. Secretary, Mr. R. John Hughes, Chief Sanitary Inspector, Rhyl; representatives on Central Executive Council, chairman and secretary *ex-officio*, and Mr. Evan Roberts, Carnarvon.

Mr. ERNEST WORRALL then delivered the chairman's annual address, selecting for his subject, "Our Programme." The address was of a most able and interesting description, and was warmly received. At the close of the discussion, Mr. Worrall replied to the vote of thanks and remarks of members.

The second annual conference of the Association is to be held at the Town Hall, Manchester, by kind permission of the Lord Mayor, on Friday and Saturday, July 1st and 2nd next. On the 1st proximo a series of meetings will be held, including annual meetings of the Association and North-Western District Centre, and of the newly-formed Central Executive Council, a special conference for members only being held at the close of these meetings.

On the second day the members will be formally welcomed to the city by the Lord Mayor and Chairman of the Health Committee (Alderman Walton Smith, J.P.). At the close of the reception the usual public conference, open to all Sanitary Inspectors, will take place, when discussions will be initiated on "The Local Government Act of 1894, and its Effect on Sanitation," "The National Registration of Plumbers," "The Training and Education of Sanitary Inspectors."

After luncheon a special excursion will take place, *viâ* the Ship Canal, to the Carrington Moss Estate belonging to the Manchester Corporation, where tea will be served.

A most successful meeting is anticipated.

Reports.

MEDICAL OFFICERS OF HEALTH.

Surrey County Council.

THE annual report of Dr. Seaton, the Medical Officer of Health for the County of Surrey, for the year 1897, contains a record of the progress made in the county in sanitary administration which is of considerable interest. The death-rate in the county for the year was 12·2 per 1000, and the birth-rate 24·7 per 1000. The zymotic mortality was 1·29 per 1000, being low, but the death-rate from typhoid continues, as Dr. Seaton remarks, to be unsatisfactory. Especial attention has been given during the year to the sources of water supply, and a conference of district Medical Officers of Health was held in March of the present year, from which much good is anticipated, as it resulted in a series of resolutions being arrived at which will tend to uniformity of practice and observations, which are so necessary in order to secure the desired end in view.

Dr. Seaton devotes one chapter of his report to a review of the Biological Methods of Sewage Disposal, which we hope to be able to publish shortly. Although the author appears to discuss the general principles of the biological process with considerable lucidity, we fear that his knowledge of the application in practice is, as we have had occasion to notice in the reports of other Medical Officers, not quite so satisfactory. No doubt the fact that the process is a new one is responsible for this. Thus, discussing (on page 54 in his report) the filter known as the coke-breeze filter, with which introduction the name of Mr. W. J. Dibdin is associated, and as adopted at Barking and Sutton, he states that the effluent from the septic tank process is directed on to "filter tanks of the type frequently referred to as in use at Wimbledon, Richmond, Merton, &c."

We had occasion to notice in our issue of May 13th last, on page 505, in our notice of the Wimbledon Sewage Works, the unscientific construction and working of the filters used there,

and we are therefore somewhat astonished to observe that Dr. Seaton falls into the obvious error of classing the coke breeze filters—used in conjunction with the septic tank process—in the category of some process at Wimbledon, where, in point of fact, no "filter tanks" exist, nor have we heard that any such exist at the other places named.

General News.

NEWCASTLE.—The Tyne Sanitary Authority propose an extension of the floating hospital.

CREDITON.—The Local Government Board has sanctioned the loan of £579 for purposes of water supply.

CARNFORTH.—The Urban District Council is considering plans for the building of slaughter-houses and other alterations.

WHITLAND.—The Rural District Council has resolved to carry out Messrs. Beesley and Son's scheme for the water supply of the town.

WESTMORELAND.—The total number of deaths registered in the county (exclusive of the parish of Kirkby Lonsdale) during the week ending Saturday, June 11th, 1898, was thirty, or equal to a death-rate of 24·3 per 1000 per annum of the estimated population. Two deaths were due to measles in Kendal.

BAMFORD.—On the application of the Rural District Council of Chapel-en-le-Frith, the Local Government Board has given its sanction to the borrowing by that Authority of £1750, with which to purchase land and construct waterworks at Bamford. The scheme prepared by Messrs. Sterling and Swann has been accepted.

RUSKINGTON.—The Local Government Board having compelled the Urban District Council to provide waterworks for the parish, plans by Mr. J. Clare, C.E., for a tower pumping station, &c., at a cost of £1709, have been forwarded to the Local Government Board for approval. The Urban District Council has resolved to borrow £1900 to cover the cost.

LONDON.—At a meeting of the Executive Committee of the Humanitarian League, held on June 2nd, the following resolution was unanimously adopted:—"In view of the failure of the present regulations to efficiently protect workers in dangerous trades, this Committee strongly urges the Home Secretary to prohibit entirely the industrial use of such deadly substances as white carbonate of lead and yellow phosphorus."

UDDINGSTON.—In view of the numerous complaints made by the inhabitants of Uddingston and the surrounding districts with reference to the depositing of ashpit refuse and other rubbish into an old disused quarry at Uddingston West Station, the Cleansing Committee of the district has entered into negotiations for the erection of a destructor in the vicinity of Fallside, about one mile north-east of Uddingston. The ground has already been measured off, and operations are expected to commence at once. The Bothwell Committee of the Cleansing Department has joined in the project, and it is quite possible that Bellshill will also join.

DUNOON.—At a recent meeting of the Cowal District Committee at Dunoon, it was agreed to form Kames into a special water district.

ESSEX.—During May there were only 72 cases of infectious disease notified in the rural districts, as against 95 for the corresponding period of last year. In the urban districts the figures were 260 and 258 respectively.

WIMBLEDON.—A proposal is under consideration for the purchase of a piece of land for a recreation ground. The Council has suggested a site, and resolved that £10,000 is to be the maximum expended on its purchase. Ten years ago less than half this sum would have purchased the same plot.

ROMFORD.—At the last meeting of the Rural District Council it was reported that the southern portion of the district was remarkably free from infectious disease, with the exception of measles, which had been very prevalent throughout the country. Three cases of diphtheria had been reported from Dagenham, but they were of an extremely mild character.

TIPTON.—The first prize of £25 in the public competition for the best plan for laying out the new Victoria Park at Tipton has been unanimously awarded to Messrs. William Barron and Son, Elvaston Nurseries, Borrowash. Their plan shows a lake nearly three acres in extent, cricket and recreation grounds, lawn tennis grounds, bowling-green, band stand, shelters, &c. They also furnish plans for lodge, entrance gates, ornamental fencing, &c. The park is thirty-three acres in extent. It will be laid out at a cost not exceeding £4500.

PADDINGTON.—We are informed that Mr. Frank Dethridge, Vestry Clerk of Paddington, has received from Dr. Tristram, Chancellor of the London Consistory Court, a faculty enabling the local Vestry to erect a town hall on the ground covered by, and at the rear of, the present Vestry Hall, Harrow-road, a building found wholly inadequate to present requirements. It is in contemplation to build a handsome town hall after the style of that at Portsmouth and Bolton, the site for which is, by the Chancellor's decision, already in the possession of the Vestry, without present pecuniary outlay.

LUMLEY BRIDGE.—The Earl of Scarborough having decided to erect a bridge across the river Wear, adjoining the existing ferry at Lumley Bridge, instructed Messrs. D. Balfour and Son, civil engineers, of London and Newcastle-on-Tyne, to prepare plans for a suitable structure, the contract for which has been let to Messrs. Head, Wrightson, and Co., of Stockton-on-Tees, who expect to start the work this month. The structure consists of a central span of 120ft. and two side spans, each 37ft. long. The main and approach girders are to be of mild steel lattice work, the bottom flanges being efficiently wind-braced and the top flanges supported with struts and overhead arches. The flooring to consist of creosoted timber with waterboards at each side. The piers to be each composed of four wrought iron piles properly braced, formed of four segments rivetted together, having cast iron pile points, and to be driven 21ft. below river bed. Gates and turnstiles are to be fixed at end of bridge and proper lighting arrangements to be provided. The structure is calculated to stand a safe distributed live load of 140 lb. to the square foot, with four times this amount for the ultimate load.

SURBITON.—At the meeting of the Urban District Council last week it was decided to increase the Surveyor's salary to £500 per year, with an advance of £10 per year for five years; that an Assistant Surveyor be appointed at £80 per year; that a competent foreman be engaged at a sum not exceeding £8 10s. per month; that the Sanitary Inspector's salary be increased to £150 per annum. In each case the officers are to devote their whole time to the work of the Council. The Clerk's salary was also increased.

DURHAM.—The scheme of water supply submitted by the Easington Rural District Council for Wingate Mill, Wingate-lane, and High Wheatley-hill, has been officially approved by the Local Government Board. It is proposed to obtain the water from the Kelloe Winning Pumping Station of Messrs. W. Scott and Co., Limited, where it is obtained from the sand feeder underlying the limestone, and will be pumped into a tank by a forcing set of pumps attached to the main pumping engine. The analysis certifies the water to be of excellent quality. After reaching the first tank, the water will again be pumped into an elevated storage tank to be erected on the highest point in the district at Wingate Mill, with capacity equal to several days' supply, from whence it will be distributed in cast iron mains over the district. The engineers are Messrs. D. Balfour and Son, of London and Newcastle.

NORWICH.—The annual meeting of the East Anglian Branch of the British Medical Association was held on the 16th inst. at the Norfolk and Norwich Hospital, the proceedings being conducted in private. After an inspection of the hospital, the meeting of the Council was held at eleven o'clock. This was followed by a demonstration of cases in the theatre. At noon the general meeting was held, when the usual reports were presented, and the retiring President (Mrs. Garrett Anderson, M.D.) introduced her successor, Mr. Haynes S. Robinson. Having been entertained at luncheon by Mr. Robinson, the members re-assembled in the Board-room, and passed the rest of the afternoon in the consideration of papers dealing with various medical and surgical subjects. In the evening the President and Mrs. Haynes Robinson received the members at afternoon tea in the keep of the Castle, and at seven o'clock the annual dinner took place at the Royal Hotel.

Personal.

MR. H. ROBINSON has been appointed Medical Officer of the Cottage Homes, Sculcoates.

MR. F. LEWIS has been appointed Medical Officer for the Fifth district of Steyning union.

MR. G. H. HUNTER has been appointed Medical Officer for the Haughley district of Stow Union.

DR. J. GORDON has been appointed Medical Officer for the Eythorne district of Eastey union.

MR. ROBERT HILL has been appointed Inspector of Nuisances for the urban district of Chesham.

DR. E. F. SYRETT has been appointed Medical Officer for the seventh district of Sudbury union.

MR. J. K. LEWIS has been appointed Medical Officer for the Rewe district of St. Thomas union.

MR. E. B. DENNY has been appointed Medical Officer for the Hainton district of Louth union.

MR. ARTHUR WILLIS has been appointed Medical Officer for the Sixth district of Newmarket union.

DR. JAMES GORDON has been appointed Medical Officer for the second Hougham district of Dover union.

MR. JOSEPH F. PORTER has been appointed Medical Officer of Health for the rural district of Helmsley.

DR. PETER FRASER has been appointed Medical Officer of Health for the urban district of Llanrwst.

DR. HARRISON has been reappointed Medical Officer, and Mr. A. J. Catt Inspector of Nuisances, for Sandwich.

DR. HENRY FAWCETT has been appointed Medical Officer of Health for the rural district of Middlesbrough.

THE offices of Reeves' Chemical Sanitation, Limited, have been removed to 17, Victoria-street, Westminster, S.W.

MR. JOS. EVANS and Mr. W. R. Evans, of Traffgaent, have been elected Surveyors to the District Council of Haverfordwest.

THE Local Government Board has sanctiond the appointment of Mr. Statham as Sanitary Inspector for the urban district of Haywards Heath.

MR. E. S. TRUMAN, who has been acting as Deputy Surveyor to the Pottersbury Rural District Council, was on Thursday last unanimously elected to the permanent post.

MR. TOM VICKERS, Surveyor of Newark Rural District Council, has been appointed Surveyor to the Bexley Urban District Council. There were 119 applicants for the post.

DR. R. W. SOPER has been reappointed Medical Officer, and Mr. T. Veale Sanitary Inspector, to the Dartmouth and Totnes Port Sanitary Authority at the same salaries as before.

WE are requested to state that the announcement of the appointment of Dr. Chawner as Medical Officer of Health of the urban district of Clay Cross was premature. Dr. Chawner has been appointed Medical Officer to the Clay Cross district of the Chesterfield union, but not to the urban district.

Sewerage Schemes.

[TO MUNICIPAL ENGINEERS AND SURVEYORS.—The Editor will be pleased to receive items for publication relating to sewerage schemes projected or inaugurated, together with explanatory diagrams or photographs. The former should be drawn and lettered in black ink.]

AT a recent meeting of the Ogmore and Garn Council the Committee appointed to inspect systems of drainage in other towns recommended the adoption of the septic system. The Local Government Board had written sanctioning the septic tank system, subject to certain conditions being observed. It was finally agreed that the Surveyor prepare an estimate of the cost, and that the Clerk inquire the Septic Syndicate's terms.

MR. H. C. STEPHENS has introduced a Bill to enable Local Authorities to deal separately with the sewage and drainage of their districts.

IN consequence of an application by the Portishead Urban District Council for sanction to borrow £3000 for purposes of sewerage, a Local Government Board inquiry was held last week.

THE Bakewell Rural District Council has decided to apply to the Local Government Board for sanction to borrow the sum of £900, on account of the Little Longstone works, and £2600 for the Winster scheme.

THE work connected with the drainage of Westgate was commenced last week. Surface drains will soon become a thing of the past, and the village consequently more up to date in regard to sanitary arrangements.

THE Trowbridge Urban District Council has agreed to ask Bradford-on-Avon District Council —both these Authorities being faced with the sewage disposal difficulty—to join in experimental work for testing the bacteriological principle.

A LOCAL Government Board inquiry was held recently at Bewdley relative to a complaint lodged with the Board by the Worcester County Council, that the Town Council of Bewdley had made default in providing the borough with a supply of water and sufficient sewers.

A LOCAL Government Board inquiry has been held at Shifnal (Salop) in respect of an application made by the Council to borrow a sum of £3300 to carry out a drainage and sewage disposal scheme prepared by Mr. Edward W. Ives, C.E., of Derby, and £3745 for a water scheme. The inquiry was adjourned.

THE Devizes Corporation has been informed that samples of effluent coming from its sewage works were very far from satisfactory. The explanation given by the Surveyor is that owing to the insufficiency of the main outfall sewer to take storm water, a quantity of crude sewage recently found its way to the brook.

A LOCAL Government Board inquiry was held recently at Rugby with reference to the application of the Urban District Council to borrow £2650 for the purchase of land for sewage disposal purposes, £1920 for a new fire engine station, £770 for an improved outfall sewer, and £2500 towards the cost of erecting new public offices.

A LOCAL Government Board inquiry has been held at Dalkey in respect of an application by the Commissioners for a loan of £700 to enable them to carry out certain sewerage works in the township. Mr. Walsh, who prepared the plans of the sewers proposed to be constructed, was examined, and estimated the cost at about £630. The sewers were badly wanted in the district.

THE Chester-le-Street Rural District Council has instructed Messrs. D. Balfour and Son, of London and Newcastle, to report on a scheme of main sewerage for Chow Dene, Wrekenton, Eighton Banks, and Team Colliery, in the township of Lemesley, to be connected with the western sewer of the Corporation of Gateshead.

AT the last monthly meeting of the Dufftown Commissioners the question of disposal of the burgh sewage was again considered, and Mr. Gordon, C.E., Inverness, who had been engineer to the Commissioners when the scheme was carried out in 1881, was appointed to make a report and plan to be submitted to the next monthly meeting.

THE Derby Town Council at the conclusion of its last meeting resolved itself into a committee to consider the latest phase of the sewage question. The Mayor reported the result of his negotiations with Lord Waterpark with regard to the proceedings threatened by the County Council. A subcommittee was appointed to confer further with the County Authorities for the final settlement of the terms of the proposed order.

THE Local Government Board has written the Epping District Council stating that the scheme of sewerage and sewage disposal for Theydon Bois (in respect of which the Council wished to borrow £1800) was generally satisfactory, but arrangements should be made at the outfall for pumping the sludge from the proposed sludge pits to the settling tanks for treatment. Further, a provisional agreement should be entered into for the acquisition of the sewage disposal land on lease for a period of not less than thirty years.

THE Provisional Order applied for by the Rural District Council of Blaby for power to acquire lands for the disposal of the sewage of Enderby, recently came before the chairman of the Commons' Committee of Ways and Means. The Council proposes by this order to acquire seven acres of land on the eastern side of the Narborough and Enderby Railway, owned by Mr. Charles Smith, and occupied by Mr. Thomas Muddimer, with the right of way over an occupation road to the land to be purchased. The order was confirmed.

THE four experts to whom the Manchester Corporation referred its scheme of sewage disposal, Mr. Baldwin Latham, Dr. Percy, Mr. F. Frankland, and Professor Perkin, have issued formal notice that they have undertaken the duties entrusted to them. The four gentlemen named were also requested and authorised to advise as to any alternative scheme which might be put before them, and they now give notice that they are prepared to receive written communications setting forth any scheme that may be suggested for their consideration. At the same time it is distinctly stated that no premium is offered, nor will any expenses be paid in respect of any scheme so submitted. The experts have made an inspection of the Davyhulme Sewage Works.

THE Doncaster District Council has resolved that a sewage scheme for Adwick-on-Dearne, prepared by Mr. Barrass, estimated to cost £335, be laid before the parish meeting, and a sewage scheme for Adwick-le-Street, to cost £547, is to be submitted to the Parish Council for that place.

THE Local Government Provisional Orders (No. 8) Bill recently came before the Unopposed Committee of the House of Commons. The object of the measure is to confirm certain Provisional Orders of the Local Government Board, one of which enables the Urban Sanitary Authority for the City of Nottingham to compulsorily acquire certain lands for the disposal of the sewage of the city. The Bill was passed through the committee stage, and ordered to be reported for third reading.

A LOCAL Government Board inquiry has been held at Mirfield respecting the District Council's application to borrow £5800 for purposes of sewage and sewage disposal, £1547 17s. 6d. being the estimated cost of the drainage of the Upper Hopton district, and £4252 2s. 6d. for a proposed new effluent sewer at the sewerage farm, Ravensthorpe, to underdrain the whole of the land required (33½ acres) for sewage disposal purposes. Dr. Wilson, Chief Inspector to the West Riding Rivers Board, and one of his assistants were present at the inquiry, and said the Council had been pressed to carry out the works because they were turning crude sewage into the stream which had passed over the sewage farm land instead of through it. Mr. Thompson, solicitor, Mr. E. H. Clare (land surveyor and agent to the estate) and Mr. C. Cott, C.E., appeared on behalf of Lady Montgarrett's trustees, through whose land the proposed effluent sewer would pass, but they withdrew their opposition to the scheme on the understanding that the necessary protection clauses and stipulations as to easements would be inserted in the agreement to be made between the parties.

Lighting.

THE Urban District Council of Teignmouth has decided to lay a 14in. gas main, and to invite tenders for the loan of £2000 to carry out the work.

AT a recent meeting of the Town Council of Ryde the question of the electric light was discussed, and the Mayor, amidst applause, promised to call a meeting of the townspeople to consider it.

THE Worthing Corporation has agreed to the early introduction of the electric light into the borough, but will require the contractors who are ultimately selected to work the undertaking at a stipulated rental for five or seven years.

THE annual meeting of shareholders in the Milngavie Gas Company has been held. The profit during the year is £397, and after paying the usual 5 per cent. dividend there is a good balance carried forward to meet the extra expenditure in the future.

AT the last meeting of the Shrewsbury Town Council a motion was carried instructing the Town Clerk to make application to the Local Government Board to sanction a loan of £35,000 for the purchase of the undertaking of the Shropshire Electric Light and Power Company and to carry out extensions.

THE directors' report of the Hawick Gas Light Company has been issued, and it shows the past year to have been a prosperous one, for after paying a dividend of 10 per cent. there will be a balance carried forward. The profit for the year amounted to £1930 17s. 4d. The directors recommend that the price of gas be continued at 3s. 4d. per 1000 cubic feet.

AT a recent meeting of the Dunfermline Gas Commission, it was stated that the profit on the past year's working of the gasworks amounted to nearly £3000. The Gas Committee had decided to reduce the price of gas from 3s. 7d. to 3s. 6d. per 1000 cubic feet, and to reduce the charge for meters by one-half.

IT is reported that the Midland Electric Light Company has given formal notice to the Town Clerk of its intention to again apply to Parliament for statutory powers for supplying Leamington with electricity for lighting purposes. The Leamington Corporation is at the present time promoting an Electric Lighting Order for this same purpose.

A SPECIAL meeting of the Town Council of Glossop was held last week to consider a scheme for lighting the borough with electricity. The scheme submitted comprised an electric station and works on a site adjacent to the Glossop Iron Foundry, from which centre the electric light would be supplied throughout the borough. The street lighting along the route would be electric, and the existing pillars would be utilised in most of the streets. The cost of working, maintenance, rent of site, and redemption and interest of capital would be about £1975 per annum, and the income would be, per 4000 lamps, about £2000, which would give a clear margin of £25 profit. The capital estimated to be expended is about £15,000. It was decided to adjourn the subject for a month, in order that the probable consumers could be canvassed on the subject.

THE Birmingham City Council has decided to purchase the undertaking of the Birmingham Electric Supply Company, Limited, at a cost of £420,000, and to promote a Bill in Parliament next session for lighting the streets by means of electricity. The shares of the company to be purchased were floated at £5, but the Corporation has agreed to buy at ten guineas per share, and to take over all assets and liabilities of the company as a going concern from January last. The profits of the company last year were over £12,000. On Tuesday last a meeting of the shareholders of the Birmingham Electric Supply Company was held to consider the proposed sale of the undertaking to the Corporation. It was decided almost unanimously to approve of the sale, and request the directors to make the necessary arrangements for carrying the agreement into effect. It was also decided to grant the directors £2000 for their services.

On Thursday, the 16th inst., at a meeting of the St. George's (Hanover-square) Vestry, Mr. G. W. Smith moved that a special committee of twelve members be appointed to consider the best means of lighting the parish by electricity, and to approach the electric light corporations. He said it was strange that the richest parish in the world should be so behind others in introducing electric light. Although, perhaps, it was no use going into the past, he could not help mentioning that the ratepayers had lost a great opportunity of making a good profit for themselves in allowing private companies to get a footing in this parish. However, he hoped the Vestry would now rouse itself and light its streets by electricity, which would give a clear light and be a great public convenience and benefit. At present the streets, especially in the out ward, could scarcely be said to be lighted, as there it was "darkness made visible." He felt sure the companies would meet the Vestry in a liberal spirit. Mr. Macdonald seconded the motion, and it was carried unanimously, and a strong Committee was appointed, consisting of Lord Hobhouse, Colonel the Hon. H. Legge, Mr. R. C. Antrobus, L.C.C., Mr. Bradford, Mr. Macdonald, and others.

SIZE AND WEIGHT OF MICROBES.

In the theatre of the Royal Institution, Dr. E. E. Klein, lecturer on physiology at St. Bartholomew's Hospital, gave the first of two lectures on "Achievements in Bacteriology." In the course of his remarks the speaker quoted some remarkable statistics concerning the microbe and its manners. Its dimensions were so insignificant, he said, that a postage stamp would accommodate 500,000,000 of the species which wrought so much destruction at Maidstone. Their fecundity was prodigious, so much so that if fifteen drops of water polluted with bacteria were allowed to fall into a cup of broth the germ population would have increased in twenty-four hours to 80,000,000. So profound had been the researches of the scientists who made this matter a special study, that not only had the bacteria associated with various diseases been discovered—photographs of the different kinds were shown on the screen—but their weight had been estimated. As an instance of this fact Dr. Klein said that it would take 122,000,000 specimens of *Bacillus typhi abdominalis* to weigh a gramme. So penetrating had been the studies of the bacteriologist that he could now detect one part of sewage even if it was contained in as many as 500,000 parts of water.

Correspondence.

We do not in any way hold ourselves responsible for opinions expressed by our correspondents.

THE PURE BEER QUESTION.

(*To the Editor of* The Sanitary Record.)

Sir,—I note with interest your article on this subject, particularly that part which refers to Mr. Cassal's evidence as to the analogy, so far as regards mercantile rectitude, with the case of margarine sold as butter. I would somewhat amplify the demands upon the vendor of beer. The purchaser should have guaranteed to him, not only imperial measure, but also imperial constituents; these should be the products of the fermentation of barley malt flavoured with hops. Seeing that there are other matters from which alcohol can be obtained, it may well be permitted that liquors not made entirely from malt and hops shall be legally vended as ales. In such a case the man who chooses a glass of ale to a half-pint of beer is in no sense defrauded.—Yours faithfully,

Arthur Angell.

Notes and Queries.

[Subscribers have the privilege of obtaining advice in this column on matters appertaining to Public Health Law and Municipal and Sanitary Engineering. Letters should be addressed to The Editor, "Notes and Queries," The Sanitary Record, 5, Fetter-lane, London, E.C.

Note.—If an answer be required immediately, a stamped addressed envelope must be enclosed, when we will endeavour to furnish a copy of the answer by post, as owing to the large number of queries received we cannot guarantee the insertion of a reply in the succeeding issue.

1123.—Rain Water from Roofs of Houses: When a Nuisance.—"H. S. H." writes:—"What authority have Sanitary Inspectors to enforce the conveyance of rain water from old cottage roofs and other buildings? Is it imperative that all eaves should have proper gutters and drain pipes, and would it not entail the provision of a system of drainage for the same?"

Answer.—In rural districts, where any existing house is without a rain-water shoot, and owing to the absence of such the walls or foundations of the house are rendered damp, such a condition constitutes a nuisance within the provisions of Sec. 91 of the Public Health Act, 1875, and notice may be served under Sec. 94 to abate the same by providing rain-water shoots with fall pipes, the same to be connected to a drain by being made to discharge over a trapped gully. It is rarely necessary or advisable to provide a separate system of drainage for the disposal of roof water in rural districts, the drain from the rain-water shoot should be connected to the drain receiving slop-water.

1124.—Inspector of Nuisances and Sanitary Inspector: Description.—"W." writes:—"Will you kindly inform me whether there is any difference in the offices of Sanitary Inspector and Inspector of Nuisances?"

Answer.—No. The description or title "Inspector of Nuisances" and "Sanitary Inspector" have the same meaning. In the Public Health Act, 1875, the officer is designated "Inspector of Nuisances," and the more euphonious title of "Sanitary Inspector" does not occur. In legal proceedings it therefore follows that the title, "Inspector of Nuisances," must be used. It is generally recognised that this title should be changed to Sanitary Inspector, as although in the Public Health Act, 1848, this officer was a mere inspector of nuisances, his duties have been so extended that the title is now inadequate. The Legislature having recognised this, the officer is described in the more recent Public Health Acts, viz., The Public Health (London) Act, 1891, and Public Health (Scotland) Act, 1897, as Sanitary Inspector, and the older title has been abolished.

1125.—Clerks of Works and Association of Clerks of Works.—"C. R. T." writes:—"Will you kindly inform me what knowledge, accomplishments, or certificates are required in order to obtain employment as clerk of works to an Urban District Council. I have

recently passed the Sanitary Institute examination, and am now studying building construction. Is there a Clerk of Works' Association? If so, any information respecting the same would be appreciated."

Answer.—Urban District Councils do not generally appoint as a permanent official a clerk of works. Such an official is, however, appointed to see to the execution of contracts of importance, such as sewerage works, sewage farms, and for expensive buildings when in course of construction. Candidates for such appointments must have had considerable practical experience of such work; must understand plans, and be able to set out the work accurately on the site, and keep the contractor's foreman from making mistakes, and workmen from doing improper work. He must be able to distinguish readily between good and bad materials, so that inferior stuff may be rejected promptly. He should be able to furnish detailed plans of portions of the work if called upon; must be able to write well, measure up work, and test all materials which come upon the site. There is a Clerk of Works' Association, which has its offices at 4, Ham Park-road, Stratford, London, E., the secretary of which is Mr. J. Brady. The conditions of membership are as follows: (1) The candidate must be a bonâ fide clerk of works, and (2) must have been engaged as clerk of works (exclusively) for the last three years, or for four years at some former period. The candidate must also fill up a form stating the works upon which he has been engaged, and the names of the architects of those works. He must be proposed and seconded by members, and balloted for at a meeting of the Association, when one black ball in ten excludes. The Association publishes a journal of its own.

1126.—KEEPING FOWLS: NUISANCE.—"X. Y. Z." writes: "A friend of mine has just received a notice from the Inspector of Nuisances, worded as follows:—'The Mayor, Alderman, &c. &c., being satisfied of the existence of a nuisance arising from fowls and pigeons kept so as to be a nuisance to your neighbours, do hereby require you to abate, &c., and for that purpose to remove fowls and pigeons, and discontinue keeping the same so as to be a nuisance.'

"The pigeon loft and fowl-houses are scrupulously clean and limewashed. Has Mr. D. any cause for complaint if the fowl run is taken away, allowing 9ft. space between the end of run and dwelling-house? Should the now unoccupied house as shown in sketch become occupied, would there be cause for complaint, as it would be only 6ft. from their back door?

"C. is quite willing to do away with his fowls altogether, but desires to keep his pigeons. I have suggested to him that he should take down the run altogether, and re-fix his loft in the garden as marked, leaving about 14ft. clear of his loft away from either D. or F. Is my contention right that they cannot interfere with him so long as he keeps his place clean? What construction do you place on the word 'remove?'"

Answer.—If the buildings wherein the fowls are kept are maintained in a perfectly cleanly condition, we do not think the Local Authority will be able to interfere. The nuisance is not such a one as can be removed under the provisions of the Public Health Acts, and it appears to us that the notice served by the Inspector of Nuisances is not in order. We have no doubt the word "remove" as used in the notice is intended to mean abolish or cease keeping the fowls, &c.

1127.—CUBIC SPACE AND VENTILATION: ACTS HAVING REFERENCE THERETO.—"B. S." writes:—"What Acts relating to cubic space and ventilation exist which concern an Inspector of Nuisances; and is there any regulation for cubic space and ventilation on seagoing vessels, and what are they?"

Answer.—The provisions of the Acts having reference to cubic space and ventilation are as follows:—As to common lodging-houses: A Local Authority are required by Sec. 80 of the Public Health Act, 1875, to prescribe the number of lodgers which may be allowed to inhabit any room therein, and to enforce ventilation. The Local Government Board recommend that not less than 300 cubic feet per head be allowed for each individual. As to dwelling-houses: Any house or part of a house, and any tent, van, or shed which is so overcrowded as to be dangerous or injurious to the health of the inmates, whether or not members of the same family, is a nuisance as defined by Sec. 91 of the Public Health Act, 1875. And by bye-laws as to new streets and buildings, made under Sec. 157 of the Act, the Local Authority are enabled to provide for the ventilation of dwelling-rooms to new houses by enforcing a window area to each habitable room equal to one-tenth the floor space, and that at least one-half the window shall be made to open. As to workshops:—By the Factory and Workshop Act, 1895, the minimum cubic space to be provided per head must be not less than 250ft., and 400 cubic feet for overtime. As to cowsheds: Under the Dairies, Cowsheds, and Milkshops Order of 1886, a Local Authority may enforce the provision of sufficient cubic space for cows, the amount enforceable, it has been decided, being not less than 800 cubic feet per head. As to seagoing vessels: Under the Merchant Shipping Acts a cubic space of 72ft. per head has to be provided. Inspectors of Nuisances have, however, no supervision over seagoing vessels.

1128.—VELOCITY IN AND DISCHARGE OF SEWERS: BOOK ON: RECOMMENDED.—"H. T. S." writes:—"Can you recommend me a work giving the various velocities of sewage in sewers? What I require is a book showing what is the velocity and discharge from sewers when the diameter is known. I require it for checking my workings by formulæ, as I am preparing for the examination of the Municipal Engineers' Association. I have Neville's "Hydraulic Tables," but they are not clear enough for a beginner."

Answer.—An excellent book for the purpose required by our correspondent is Crimp and Bruges' "Tables and Diagrams for Use in Designing Sewers and Water Mains," price 10s. 6d., obtainable from The Sanitary Publishing Company. This book gives the velocity and discharge of sewers at all rates of inclination in a highly convenient and lucid form. In another answer we give the formulæ most commonly used for determining the velocity and discharge of circular sewers.

1129.—ORDNANCE DATUM: MEANING OF TERM.—"Student" writes:—"What is the meaning of the term 'Ordnance datum?' It is often expressed as so many 'feet above Ordnance datum.' Does it mean as so many feet above the bench-marks on buildings, &c.? Is there a small work published, explaining the Ordnance maps and terms used in connection with same?"

Answer.—The Ordnance Datum of this country was determined by the Ordnance Authorities to be "the approximate mean water at Liverpool." All the levels marked upon the Ordnance maps are the altitudes in feet above this datum, so that in the north of Scotland or in Wales, equally with Southampton or Yarmouth, all over the kingdom, whenever a figure preceded by a dot, thus, ·33·6 or ·336·0, is upon a map, it shows in the one case 33ft. and $\frac{6}{100}$ths of a foot, and in the other case 336ft. above this datum respectively. It must be observed, however, that it is neither usual nor necessary to adopt the Ordnance Datum in ordinary building operations, but to assume some convenient depth below the lowest point of the section, the reason for which is that all altitudes shall be above this datum, so that they will always have a positive, and never negative heights. The following books, which are published by the Ordnance Survey Department, will be useful, viz.:—(1) "Explanatory Remarks on the Character of Type, Abbreviations, Symbols, Areas, &c.," price 6d.; (2)

"Characteristics of Writing and Boundaries, used on the 1in. and 6in. Maps of Great Britain," price 6d.; (3) Characters for the Writing of the Names and Symbols for the Indicating of Boundaries on the 10ft., 25in., and 6in. Maps," price 6d. Any of the books may be obtained from the Sanitary Publishing Company, post free, for 6½d. each.

1130.—VELOCITY AND DISCHARGE OF SEWERS.—"H. S. T. writes:—"Will you please oblige me with particulars as to what would be the velocity and discharge of a (1) 9in. and (2) a 12in. circular sewer respectively, having a fall of 1 in 1000 running half full?"

Answer.—One of the simplest and most commonly used formulæ for obtaining the velocity in circular sewers is Eytelwein's, and is as follows:—

$v = 55\sqrt{2hf}$, where

v = velocity of flow in feet per minute;

h = hydraulic mean depth in feet (which in sewers running full or half full is one-fourth the diameter,

f = fall in feet of sewer per mile.

Taking the cases given by the querist, and applying the formula, we have for a 9in. sewer

$v = 55\sqrt{2 \times \cdot1875 \times 5\cdot28}$, and

$v = 55\sqrt{1\cdot98}$, and

$v = 55 \times 1\cdot4$, and

v = 77ft. per minute, which is the velocity in a 9in. sewer, having a fall of 1 in 1000.

For a 12in. sewer we have

$v = 55\sqrt{2 \times \cdot25 \times 5\cdot28}$, and

$v = 55\sqrt{2\cdot64}$, and

$v = 55 \times 1\cdot624$, and

v = 89·3ft. per minute, which is the velocity in a 12in. sewer, having a fall of 1 in 1000.

Having obtained the velocity of sewage, the discharge is obtained by the formula

D = V × A, where

D = Discharge in cubic feet per minute;

V = Velocity in feet per minute;

A = Cross sectional area of flow (*i.e.*, diameter squared × ·7854). In the case of a 9in. pipe running half full the discharge will be $\left(\frac{\cdot75 \times \cdot75 \times \cdot7854}{2}\right) \times 77$ (velocity in feet per minute) = 17 cubic feet per minute discharge.

In the case of a 12in. pipe running half full the discharge will be $\frac{1 \times 1 \times 7854}{2} \times 89\cdot3$ (velocity in feet per minute) = 35·06 cubic feet.

1131.—THE DIBDIN OR SUTTON SEWAGE SYSTEM.—"S. T. H." writes:—"Can you kindly explain the Sutton or Dibdin (as it is sometimes termed) system of sewage treatment?"

Answer.—The Sutton or Dibdin system of sewage treatment consists in passing crude sewage (from which floating paper only is screened) without previous chemical treatment into artificial filters composed of burnt clay, ballast, clinkers, coke, or other hard and coarse material, from which the finer material (below ¾in. gauge) has been rejected. The filter is provided with a main underdrain to which a valve is affixed for closing the outlet when the filter is at work. The sewage is applied intermittently, the filter being charged, and the sewage is allowed two hours contact, after which the valve is opened, the sewage is drawn off, and the filter is then allowed two or more hours' rest for aëration. By this treatment the major portion of the sewage is absorbed by the agency of bacteria present in the filter. The effluent from the coarse filter is then run on to another filter, similar in construction to the first, except that it is of fine grain, for final treatment, the filtrate resulting therefrom being of remarkable purity as compared with effluents from most processes of sewage purification. For further particulars of the system, see Dibdin's "Purification of Sewage and Water," 21s., Sanitary Publishing Company.

Contracts Open.

The dates given below are the latest up to which tenders can be received.

HAMSTERLEY (NEAR BISHOP AUCKLAND).—June 24th—July 4th.—Sewer.—Mr. C. Johnston, surveyor, 1, Cradock-street, Bishop Auckland.

LEAMINGTON SPA.—June 27th.—Urinal.—The Borough Engineer, Town Hall.

RAWTENSTALL.—June 27th.—Drains.—Mr. A. W. Lawson, A.M.I.C.E., borough surveyor, Municipal Offices, Rawtenstall.

SALE.—June 29th.—Sewers, &c.—Mr. Alexander G. M'Beath, C.E., 4, School-road, Sale.

TANFIELD (DURHAM).—June 29th.—Sewers.—Mr. Robt. Heslop, surveyor, Burnopfield.

KEIGHLEY.—June 30th.—Sewer.—Mr. W. H. Hopkinson, borough engineer, Keighley.

ALTON (HANTS).—July 1st.—Sewers, &c.—Messrs. R. B. Grantham and Son, 23, Northumberland-avenue, London, W.C.

BRIERFIELD.—July 2nd.—Sewer.—Mr. James T. Landless, A.M.I.C.E., Station-buildings, Nelson.

ETON.—July 2nd.—Sewer, &c.—Messrs. Bailey, Denton, Son, and Lawford, Palace-chambers, Westminster.

CAERPHILLY.—July 4th.—Sewer.—Mr. A. O. Harpur, surveyor, Council Offices, Caerphilly.

WHEATHAMPSTEAD.—July 5th.—Sewers.—Mr. T. Foster Woodman, F.S.I., St. Albans.

HONLEY (HUDDERSFIELD).—July 19th.—Sewerage Works.—Mr. W. H. Radford, C.E., Angel-row, Nottingham.

HONLEY (HUDDERSFIELD).—July 19th.—Sewer.—Mr. W. H. Radford, C.E., Angel-row, Nottingham.

Vacancies.

ASSISTANT INSPECTOR (WESTON-SUPER-MARE, July 2nd).—For the Urban District Council. Salary, £1 per week. Mr. Sydney C. Smith, clerk, Town-hall, Weston-super-Mare.

BOROUGH SURVEYOR (BACUP, July 6th).—For the Town Council. Salary, £200 a year. Mr. Robert Hyde, town clerk, Bacup.

DRAUGHTSMAN.—Salary, £2 per week. Mr. R. S. Rounthwaite, A.M.I.C.E., borough engineer, Town Hall, Sunderland.

DRAUGHTSMAN (SALFORD, June 24th).—Mr. Samuel Brown, town clerk, Town Hall, Salford.

INSPECTOR OF NUISANCES (SWANSEA, June 27th).—For the Town Council. Salary, 25s. per week. Mr. John Thomas, town clerk, Guildhall, Swansea.

SANITARY INSPECTOR (PLUMSTEAD, July 11th).—For the Plumstead Vestry. Salary £104 per annum, rising by increments of £6 for one year after Lady Day, 1899, and £5 per annum afterwards to £130 per annum. Mr. Edwin Hughes, vestry clerk.

SURVEYOR, &C. (ECCLESHILL, YORKS, June 27th).—For the Urban District Council. Salary, £130 per annum for the combined offices. Mr. Jos. Richardson, clerk, Eccleshill, near Bradford.

SURVEYOR, &C. (ITCHEN, June 28th).—For the Urban District Council. Salary, £125 per annum, increasing to £150 within three years. Mr. William Henry Bell, clerk, Woolston, near Southampton.

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COMPETITIONS.

LINSDALE, July 1st.—Sewage Disposal and Water Supply. — The Linsdale Urban Council invite plans, specifications, with estimates for dealing with the sewage disposal and water supply for the above-named district, such plans and estimates to be sent to Mr. R. I. Platten, clerk, Linsdale, Leighton Buzzard, by July 1st, marked with a motto or *nom de plume*, and endorsed "Linsdale Sewerage and Water Supply."

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CO-OPERATION OF READERS REQUESTED.

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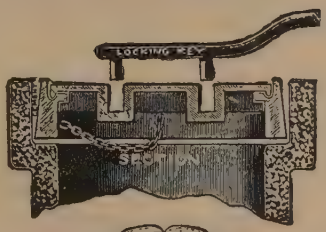

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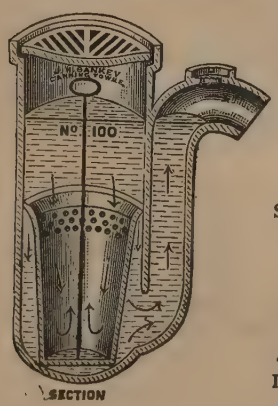

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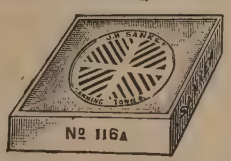

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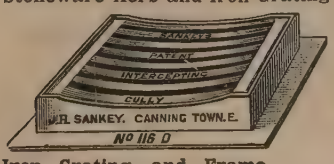

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Preference will be given to one who has had practical experience.

Salary £70 per annum.

Uniform will be provided.

Applications, endorsed "Inspector of Nuisances," with three recent testimonials, to be sent to me on or before 9th July next.

GEO. B. KENNETT,
Town Clerk.

Guildhall, Norwich,
13th June, 1898.

THE ECCLESHILL URBAN DISTRICT COUNCIL require a SURVEYOR and WATER-WORKS MANAGER and INSPECTOR of NUISANCES, who will have to devote the whole of his time to the duties of the offices.

Salary £130 per annum for the combined offices.

The selected candidate will be required to commence his duties forthwith upon appointment, and to reside within the district.

Candidates must be between the ages of 25 and 40 years.

Applications, stating age and experience, should be made by letter, addressed to the undersigned, and marked outside "Surveyor," not later than Monday, June 27th, 1898, accompanied by recent testimonials, not more than three in number.

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The Council invite APPLICATIONS for the POST of ASSISTANT SANITARY INSPECTOR for the District.

Applicants must hold a Certificate, and be duly qualified. The person appointed will be required to live in the District, and devote the whole of his time to the duties of the office.

Commencing salary £104 per annum, subject to the sanction of the Local Government Board.

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E. H. LISTER,
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Food and Health

SUPPLEMENT TO

THE SANITARY RECORD.

No. 12. JANUARY, 1898.

FOODSTUFFS UNDER SCRUTINY.

WHAT TO EAT AND DRINK, AND WHAT TO AVOID.

"SANITARY RECORD" ANALYSES.

IMPORTANT ANNOUNCEMENT.

OWING to the growing popularity of this feature of our "Food and Health" Supplement, we have found it necessary to make arrangements whereby, in future, much fuller reports will be given of proprietary articles than have appeared hitherto. It has been our custom to solicit samples of articles for investigation from the manufacturers direct, unconditionally; but in future such samples as we receive from the proprietors thereof will require to be accompanied by a declaration that the sample is selected from stock, and not put up for the special purpose of analysis. Failing this we shall make the purchases ourselves, selecting the articles at random from the various retail establishments where they are sold.

We have retained the services of Mr. C. G. Moor, M.A., to examine and report on the various substances submitted to us.

All such analyses may of course be quoted as having appeared in THE SANITARY RECORD, but the date must be given, and Mr. Moor's name must not be quoted for advertising purposes without special permission.

"Index" Rolled Oats.

"I have duly examined the sample of 'Index' Rolled White Oats (Duncan's Patent), manufactured by the Northern Milling Company, Limited, Belfast, with the following results:—

Moisture	9·9
Fat	7·3
Albumenoids	18·9
Ash	2·1
Insoluble Fibre	1·4
Carbohydrates, &c., by difference	60·4
	100·0

These figures are satisfactory evidence of the good quality of the sample.

"The mineral matter contained 0·3 per cent. of phosphoric acid (P_2O_5), calculated on the original sample, or one-seventh of the total ash.

"The percentage of albumenoids present, which are the most important constituents, is above the average for oatmeal, and the figure for the insoluble fibre shows the sample to be very free from husk.

"Microscopic examination proves the sample to be free from extraneous matter. The flavour and appearance leave nothing to be desired, and I am of opinion that these oats are in every respect of excellent quality."

Hay's Frumentine.

"I HAVE examined the sample of 'Hay's Frumentine' prepared by William Hay, Limited, manufacturing chemists, Hull, with the following results:—

Water...	12·3
Fat	4·6
Ash	2·7
Insoluble fibre	2·1
Albumenoids	21·3
Carbohydrates, &c, by difference...	57·0
	100·0

"The mineral matter or ash contained nearly one-third of its weight of phosphoric acid calculated as P_2O_5, while the high figure, 21·3 per cent., representing the albumenoids, shows that a large proportion of 'germ' must enter into the composition of this food. As much as 14·3 per cent. of the food is soluble in cold water, and this fact, taken in conjunction with those above mentioned, is sufficient to give it a high place among foods of this class.

Digestibility of Eggs.—Eggs are digestible when they are lightly cooked or uncooked, indigestible when hard boiled. They are also more digestible when they are beaten than when they are cooked in the shell. But not eggs only, every food is more easily digestible when it is vesiculated than when it is solid, and, therefore, penetrated with difficulty by the digestive fluids. An egg should be beaten and lightly cooked for an invalid. The quality of the egg varies with the food of the fowl. Hens' eggs are commonest and also best for cooking purposes. Ducks', guinea-fowls', plovers', and other eggs are esteemed for the table; but they are ill adapted for puddings and custards, because the white is transparent and soft and does not set firm. The eggs of reptiles—*e.g.*, the turtle—are also eaten.

DISEASED AND UNWHOLESOME MEAT.*

By T. Robinson.

The following notes are written with the view of drawing the attention of general practitioners to the subject of meat in its relation to disease. I have drawn upon my personal experience whenever I have been able to do so, but lay no claim to originality in either matter or treatment. In the following table good meat is broadly distinguished from bad, but it must be understood that the goodness here is simply that of meat the healthy nutrition of which has not been impaired, while the badness is that of the exact converse. Beef is the flesh specially described, but the standard may be applied to other flesh with slight variations:—

BEEF.

"Good" Meat.	*"Bad" Meat.*
COLOUR.	
Bright red, "marbled" with fat.	Dusky red or pale, or both; brownish or discoloured patches; or may be even greenish if putrefactive.
No hæmorrhagic spots.	Hæmorrhagic spots frequent.
FAT.	
Firm, whitish, with tinge of yellow. Not blood-stained.	Soft, unset, as a rule yellow, and often stained or studded with hæmorrhagic spots.
Containing no jelly or watery juice.	May contain jelly or watery juice.
SMELL.	
Fresh and not unpleasant.	Sickly, offensive, or of drugs.
TO TOUCH.	
Firm and elastic. Not wet or sticky. No pitting or cracking on pressure.	Soft, easily torn, wet or sticky. Pitting on pressure.
JUICE.	
Bright red in colour; sweet and fresh to smell.	Dark in colour, or very pale, with bad odour.
TASTE.	
Pleasant.	Absent, or unpleasant.

Horse flesh is of a dark purple colour, has a peculiar sickly odour, and is not "marbled" with fat; the muscular fibres are much coarser, and the fat a greasy yellow.

Calf flesh is paler, and not so firm to the touch as beef flesh.

The flesh of the pig is also paler and less firm, and the fat softer than that of the beast.

Good mutton is in colour a duller red, is firm, and has a hard, white fat.

I shall now proceed to describe in detail some of the special causes of unwholesomeness in butcher's meat.

Tubercle is the most important, and the most common of the diseases of animals, and is therefore considered first and separately. So common is it among animals the flesh of which come under the head of butcher's meat, that I should say quite 75 per cent. of all meat "seized" under the Public Health Acts is condemned on account of it. It is found most frequently in the lungs, pleura, lymphatic glands, liver, peritoneum, omental fat, and kidneys, in the order named. Seldom, if ever, is a case of tubercle found in which the lungs are not affected, but it has been estimated by McFadyean that only 3 per cent. of beasts suffering from tubercle have that disease affecting the udder. Oxen, swine, and sheep suffer most frequently in the order named.

The disease usually shows itself in the form of nodules or caseous masses, varying in size from that of a pin's head to an orange, in the lungs, the liver, kidneys, and lymphatics; but the peritoneum and pleura are generally studded with hard nodules, giving rise to the terms "grapes" and "pearls" in use among farmers and butchers. The nodules or knots are by some called "kernels," but kernel is the name generally used by butchers for a lymphatic gland. Some caseous nodules are hard or calcareous, some softer and breaking down, and some are almost encapsuled and separated from the surrounding tissues. Calcareous particles are almost invariably present in the cheesy tubercle of cattle; among the latter also tubercle is much more prone to form hard calcareous masses than to break down.

The flesh of animals suffering from advanced tubercle is most frequently thin and wasted, and has very little fat; it is dark in colour, sets badly, and is often wet or even dropsical in places; the nutritious quality has without doubt greatly deteriorated—putting aside the fact that it may contain tubercle bacilli or spores—and should therefore be condemned. On the other hand, I have seen, and not uncommonly, animals in good condition, fat and firm, and carrying plenty of flesh, that have had to be condemned after being slaughtered on account of generalised tuberculosis; and in one case—in a beautiful beast—the deep inguinal glands were found to contain small caseous nodules in addition to generalised tubercle in chest and abdomen. It was impossible to tell during life that these animals were suffering from tuberculosis. From this it is clear that animals may suffer from generalised tuberculosis, either in the nodular or caseous form, and yet grow fat, when there is no "breaking down" into pus; but when once the "breaking down" commences, then the condition of the animal begins to deteriorate.

Dr. Woodhead, in his evidence before the Royal Commission on Tuberculosis, declares the temperature in the centre of a cooked joint of over 6 lb. in weight seldom reaches 60 deg. Cent., and goes on to say:—"Ordinary cooking, such as boiling, or more especially roasting, though quite sufficient to sterilise the surface and even the substance for a short distance from the surface of the joint, cannot be relied upon to sterilise tubercular material (and caseous matter) included in the centre of rolls of meat, especially when these are more than 3 lb. or 4 lb. in weight. The least reliable method of cooking for this purpose is roasting before the fire; next comes roasting in an oven, and then boiling."

Now, it comes to this, by way of illustration:—Given a leg of mutton or a round of beef rather undercooked with a caseous gland embedded somewhat deeply in the same, what amount of risk of infection is run in eating the flesh? Again, what risk is run when a medical man orders a child or adult raw—or nearly raw—meat juice, and such material is derived from a tuberculous animal? I can only answer that there is a very appreciable risk, and that this has been proved by direct experiment on the lower animals. Kastner obtained positive results by the injection into animals of the juice of confiscated flesh of tuberculous animals; and Steinheil succeeded in transmitting tubercu

* *Quarterly Medical Journal.*

losis to guinea pigs by administering the expressed juice from flesh in which no tubercle could be seen.

That milk is a source of grave risk cannot be disputed.

The practical question, then, that we have to answer is this:—Is there an actual risk of infection through the ingestion of uncooked, or partially cooked, flesh or milk of tuberculous animals. The answer is undoubtedly in the affirmative.

The Jews are much more exempt from tubercle than any other race, and there is little doubt that much of this exemption is due to the great care exercised in the choice and dressing of their meat. The following two facts are worthy of note:—In Copenhagen slaughter-houses, in 1890 to 1893 inclusive, the percentage of tuberculous animals was 17·7 for oxen and cows, 15·3 for swine, 0·2 for calves, and 0·0003 for sheep; in the Berlin slaughter-houses in 1892—3 the percentage was 15·1 for oxen and cows, 1·55 for swine, 0·11 for calves, and 0·004 for sheep; in Edinburgh of 300 milch cows slaughtered in 1890 no less than 40 per cent. (varying from 12 to 83 in one cowhouse or another) were found to be tubercular. In 1895 there were in England 7389 deaths from tabes mesenterica, of which 3855 were under the age of one year; 6746 from tubercular meningitis; 42,490 from phthisis; and 6084 from other forms of tubercle; making a total of 62,709. Without adding marasmus, bronchitis, diarrhœa, and pneumonia—some of which are undoubtedly tubercular—this is a tremendous total, almost the whole of which can be laid down to tubercle.

Having answered—as I am certainly justified in doing—the question respecting the actual risk of eating tuberculous meat and drinking tuberculous milk in the affirmative, what a grave responsibility rests with the public Authorities in dealing with the traffic in diseased or possibly diseased animals. What new importance attaches to the due administration of the Dairies and Cowsheds Orders and to the question of the establishment of public abattoirs?

(To be continued.)

INFECTED MILK AND CREAM FROM ABROAD.

One of the last acts of the late Commissioners of Sewers of the City of London was to institute an inquiry into the conditions under which milk and cream are imported into this country from abroad. From their report, a copy of which has reached us, it appears that in 1894 161,633 gallons, and during the eleven months of November, 1895, 124,915 gallons of milk and cream were imported into the United Kingdom from Sweden, Holland, Belgium, Norway, Denmark, and North Russia. Of the latter quantity Sweden contributed 109,428 gallons and Holland 14,103 gallons; of the balance—1384 gallons—one-half was imported from Norway, whilst the remainder came from Belgium, Denmark, and North Russia. The committee made it their business, through the Foreign-office, to obtain copies of the regulations in force in these countries for the prevention of the sale of possibly infected milk, and the despatches subsequently received from the English Consuls have been compiled and printed in *brochure* form. In Belgium, the necessity for the special inspection of dairy farms is universally recognised, and the Belgian Government are considering the organisation of this service, but at present no regulations appear to have been publicly issued upon the subject. In the Royal decrees applying to the rule of milk there is no reference made to milk sent out of the country. In Sweden there are no regulations in force under which cattle are reared and kept, this being left entirely to the means and judgment of the agriculturist, nor are there any regulations providing for the inspection of milk and cream intended for export. With regard to the small quantity of milk exported from Finland no regulations are in force for ensuring the purity of this supply. In Holland a recent decree has been published which contains all the regulations enforced by the Government with the view to ensuring the purity of the milk supply. In Denmark care appears to be enforced in dealing with infected animals, but we find no marked reference to milk sent out of the country. The document is one which deserves the serious attention of the Government.

FOOD AND THE STATE OF HEALTH.

In selecting food in reference to health, says *Health*, it must be remembered that there are certain general rules which have been established by the best authorities through many ages and in a great variety of circumstances; there are, however, some exceptions to these general rules. Milk is considered a wholesome food, yet there are some persons who cannot take it. Cheese is a cheap and nourishing food for labouring people, but there are some persons to whom it is an active poison. This is also the case of oysters and strawberries. These exceptions are owing to some idiosyncrasy of the palate or weakness of the digestive organs, and should be regarded only as exceptions, which do not affect the general principle.

In cases of sickness, after long-continued, prostrating, or rapidly-wasting disease, the system demands immediate nourishment to supply that waste, or when there is a lack of nutriment from any cause. Food that contains the most nourishment in the most easily assimilated form is now needed; but the physician should always be consulted as to the food suitable during different diseases. Liquid food is most suitable, and should be food as well as drink. In nearly all cases of fever, milk is given when the patient can take it. Two or three grains of pepsin in a cup of milk or broth facilitate its digestion. In cases of typhoid fevers milk has often proved of great value, and is now generally recommended by the medical faculty in all cases of scarlet fever, nervous disorder, and all diseases arising from imperfect nutrition. It keeps up the strength of the patient, acts well upon the stomach, soothes the intestines, and promotes sleep. Meat broth, farina, and oatmeal gruel are also suitable at such times; but beef tea and beef juice are most generally used by physicians. They afford a fluid and easily-assimilated form of food, and have a remarkable power of restoring the vigorous action of the heart and dissipating the sense of exhaustion following severe prolonged exertions.

A SANITARY SAUSAGE FACTORY.

Not one in a thousand in this *fin de siècle* age would dream of finding a sausage factory within the precincts of an Essex dairy-farm. In fact, we were eagerly bent on keeping milk and preserving cream not made into butter. The scene we beheld on reaching Leytonstone, the birthplace of the redoubtable Sir Morell Mackenzie, who attended the late Emperor Frederick of Prussia, was truly rural. But we had missed our port. Hainault-road, which is not in Epping Forest, was our destination, and to our dismay we found it was situated in Abbott's Park, close by Leyton Station. Therefore we trudged back to the old Roman station of Durolitum, the birthplace of Sir Thomas Rowe, an Oriental traveller; and in the church there is a memorial of Sir Josiah Child, the founder of the famous Child's Bank.

Abbott's Park is close to the Midland line, and in two large fields were several colts scampering over the green turf in the ruddy glow of the November sun; and there appeared on the wall in bold letters the well-known legend—

ABBOTT BROS., Estab. 1786. { Branches— Leytonstone, Woodford, Forest Gate, Limehouse, Southend, Gravesend.

As we passed along the Hainault-road, we paused, like the school folks, to look into the cowshed, which has a large plate-glass window fronting the road, and here nursemaids and their youthful charges do congregate to watch the milkers at work, and the gambols of the tiny calves on the straw near the opening. The retail dairy next comes in sight, and we enter therein to be cordially welcomed by the genial manager, Mr. Walter Burton, whom we recognised as a "high-flyer"—an enthusiastic breeder of homing pigeons. We foregathered at once; and, after tales of tiger and elephant hunting, we were taken over the dairy-farm of Messrs. Abbott Brothers, of Gun-lane, Limehouse, which is their head office. The shop, which is attached to the manager's house, is very neatly arranged, and the decorations comprised the heads of well-tined deer, with the antlers and tusks of formidable wild beasts well known in the Indian jungle, which is familiar to Mr. Burton. On the right is the cowhouse, containing stalls for a number of cows and heifers in milk, fitted up in a manner calculated to receive the approval of the Sanitary Inspector of the County Council. In all we saw the building was in every way well adapted for the supply of pure milk to trustful and appreciative customers. Delicate babies are fed on milk from special cows, and the general public are assured that the milk is purveyed as "the cows give it." The washing-up room is close by, with a hot-water tank to enable the men to swill out the cans and churns; while the steam jet arrangement and drying rooms are contiguous. Overhead is the loft or granary, where corn, hay, straw, and chaff are stored for the live stock of the farm.

The horses required on the rounds are stabled in stalls at the end of the building containing the cows and heifers, while others are accommodated elsewhere in the yard. Next door is the coach-house, which is very commodious. In line with the coach-room is a range of thirty pig-styes, containing on an average about ten each. The houses are composed of wooden sides, asphalted roofs, with floor or platform for resting covered with straw and sawdust, and outside the floor is of cement, with a fall to the gutter. The breeds are pure Berkshires, Yorkshires, and Tamworths, and crosses from these strains. Messrs. Abbott Brothers breed and feed for exhibition, and they also utilise the cross-bred pork for toothsome joints, sausages, and brawn.

Immediately in front of the piggeries is a wooden house, covered with glass, evidently used originally for feathered stock, but now relegated to stores. From the centre of it rises a house for pigeons, which abound in the yard. A mixing trough is placed nearly in the middle of the yard, and here the feeder prepares the mash for the pigs. Necessarily, the yard is fairly wide and open, to admit of the ingress and egress of the numerous floats which rush out and in carrying the stores of this Essex Dairy Farm. The range of buildings on the left hand are devoted to the feathered world, and here fowl, goose, duck, and pigeon find a roosting-place, while some prefer the trees. The duck pond is a fair size for the flock of Chinese geese, Rouen ducks, Indian runners, &c. In front of the pond is a Swiss châlet, which once belonged to a famous licensed house in the neighbourhood, but it now holds the baskets, bags, and boxes required for the produce of the farm.

And now we have almost made a round of the premises. We enter a covered shelter, in which a pony trap can stand and be protected from the elements. Then the engine-room is reached, in which is fitted one of Mr. E. Hindley's (Bourton and London) vertical engines, which drives the separator and the sausage machine next door. This factory is quite a new erection, and was recently opened. It is a building 30ft. long, 16ft. wide, and about 20ft. high. Outside it is of glazed bricks, with overhanging eaves, tiled roof, and ventilating ridge. The natural light is obtained from plate glass windows—plate glass in the Hainault-road frontage and stained at other end—with four small windows on the sides, with revolving sashes to permit a free draught of air. Within, the factory is well appointed, and artificially illuminated with incandescent (Welsbach) light.

The floor is concrete, the walls are of white glazed brick, the roof is boarded inside and painted, being supported on iron spandrels and braced firmly together. There is a sausage machine which is worked by steam power, and an excellent supply of pure water direct from the main. In the window is a slab for displaying the finished article; and those connoisseurs of pork can see the manipulators busily at work, and select their own cut. The meat is thoroughly washed and prepared by practical men on spotlessly clean wooden slabs, or cutting tables; and the butcher's block is also an indication of the sanitary arrangements in this suburban factory. It has all the appearance of a first-class pork-butcher's shop, as there are rails with hooks on which to hang the meat to dry for use. We saw one porker—a cross between a Berkshire and Yorkshire — weighing 46 stone, which had been fattened in the yard and killed by a professional butcher on his licensed premises. About nine pigs per week are usually made into pork; and over 1000 lb. of sausages go out during the same period. With the facilities

at hand, this quantity can easily be trebled or even quadrupled. The pigs, bred and fattened, generally number 1000 per year, and there are seldom less than 300 on hand at one time. Hence "the gintleman that pays the rint" in "Ould Ireland" is likely to turn a purely local enterprise into a far-reaching and ever-spreading business. The piquancy and flavour of the Abbott Park sausages have spread their fame far and wide; and the daily increasing business augurs well for its future development.

There is a very large flock of poultry and ducks kept, chiefly for eggs, which are in great demand in all the branches. The fowls are cross-bred, such as Indian Game—Dorking, which are so good for table; and also Langshans, Plymouth Rocks, Minorcas, and Leghorns. The whole flock numbers over 300 head, and they are as free to go over lea and meadow as the air we breathe. Commodious roosting houses have been erected for their comfort, and feeding troughs are placed in convenient positions in the spacious yards. The peacock and his mates are the pride of the lot, although the plumage of many of the ducks is exceedingly beautiful. But when either of them open their mouths they exhibit the decadence of the race and sustain the reputation of unmusical 'Arrys and 'Arriets of the feathered tribe. But why that commotion? The peacock screams, his mates screech, the pigeons hie to their cots, and the fowls fly and flutter. Rose (the fox terrier) was on the trail of a rat, which she triumphantly dispatched before it could reach its lair, to the evident satisfaction of every member of the feathered world in Abbott's Park.

A DANISH MILK SUPPLY COMPANY.

By Dr. T. G. Nasmyth, M.O.H., Fifeshire.

The operations of the Copenhagen Milk Supply Company have attracted more attention than any other milk business in the world, and their system has become one for imitation. It would be impossible at this time to give more than a summary of the details of their system. First, as to the cows. The company endeavours to secure cows free from tubercular diseases, as indicated by the tuberculin test. The feeding of the cows is most carefully superintended, and the health of the cows is watched over by a staff of veterinary inspectors connected with the company. The occurrence of infectious disease is guarded against by the contract between the farmers and the company, in virtue of which the milk is at once withdrawn on the occurrence of infectious disease amongst any of the workpeople. The milk all the same is paid for all the time it is withdrawn. The company's factory covers an area of two acres of ground in a suburb of Copenhagen, conveniently situated for trains arriving from different parts of Zeeland. The milk is obtained from fifty-seven large farms and over 5000 cows, the farms being at considerable distances from the city. There is but one delivery of milk a day at the factory, which is in the evening. This consists of the top cream, second-class cream, half-skimmed milk, ordinary new milk, and children's milk.

The different milks are brought in cans of different shapes and sizes so as to avoid mistakes. When the railway truck arrives at the factory the temperature is noted, and must not exceed 50 deg. Fah. Across the truck are stretched two box compartments containing ice, so as to keep the temperature of the air in the truck, and therefore the temperature of the milk, down to the required point. They are immediately taken into a reception-room in the factory, when it is at once seen that they were fastened and sealed in such a way as to prohibit tampering with the milk on the way. The cans are opened and a small portion tasted by one of the employés, while the temperature is rapidly taken. If any taste was found in the milk, it would be rejected. The half-skimmed milk and new milks were then put in ice-water tanks, while operations at once commence on the cream and children's milk. These, or at least the latter, are at once filtered through gravel filters into a large bowl, the filters being in the cool room. There is but little work going on in this room. The milk after filtration runs along a pipe, which perforates the wall separating this room from the bottling room, which pipe is connected with six taps. From these taps the bottles are filled—one person presiding over the taps, who hands the bottle to a second, by whom the milk is adjusted to a mark on the bottle. A third corks the bottle by an ingenious machine, which leaves the cork just at the proper level on the top of the bottle, which is notched. The cork is then tied down with a string, and the string is sealed. As rapidly as they are completed the bottles are placed in crates and ice placed on them. When this operation is completed, the new milk and half-skimmed milks are similarly filtered and afterwards run into cans. These operations occupy the night shift till it is time to load and send out the morning vans, which carry the milk and creams to the houses and to the company's shops. The greater part of the business is house supply. Every precaution which ingenuity can suggest is taken to prevent fraud. The drivers cannot get at the cans, from which the milk is run off by taps projecting from the van. The operations of cleansing the cans, bottles, &c., commence as soon as the milk is sent off in the morning. The filters are sterilised and thoroughly cleaned every day. The bottles are washed with soda and hot water and scrubbed out with a brush. They are then rinsed with clean, cold water, and put on racks upside down to dry. The farmers' cans and the company's cans are subjected to a rigorous process of cleansing with limewater, hot water, and sterilising by means of steam. They are also put upside down on racks to dry. The workpeople are clad in clean overalls. The premises are most spacious. The floor of the establishment is of a specially excellent asphalt composition. The walls and roof are scrupulously clean. Care is taken that the milkers should have clean hands. The cows, especially the udders, are scrupulously clean. The morning's milk is taken at once to the dairy, where it is poured into long narrow vessels about 3ft. deep, which stand in tanks containing ice and water. When it has stood for about ten hours the cream is withdrawn in two qualities and put into two distinct cans, the milk left (half skimmed milk) being also placed in distinct cans. The afternoon's milk is at once cooled down in the dairy by flowing over a Lawrence cooler, through which circulates a mixture of ice and water. This second supply is the new milk, and is put into

separate cans according as it is ordinary, new milk, or children's milk.

Such is a brief account of the Copenhagen Milk Supply Company. In this country, while we have nothing to compare with it either for extent or completeness, there are various dairy companies imitating the Copenhagen one. Various places now go in for selling sterilised milk, samples of which are shown. When milk is thoroughly sterilised all risks of scarlet fever, enteric, diphtheria, or tubercular diseases are discounted, so that its use is decidedly to be recommended.

THE NEED OF FAT FOODS.

The idea that fat is necessarily unwholesome is a mischievous one. The proper nourishment of the body requires a certain proportion of fat. The only objection we urge against fats as foods is the manner in which they are taken. In the form of rich cakes, pastry, fried food, melted fats, as used with salads, butter on hot bread or potatoes, and the like, fats are difficult of digestion, and often interfere with the digestion of other foods. Animal fats are, at least in a free state, much less digestible than vegetable fats. Cooking renders most elements of the food more digestible; or, rather, cooking is a sort of partial digestion of most food elements.

Fats are, however, an exception to this rule. Cooking greatly increases the indigestibility of fats, which at best are hard to digest in a free state. The most acceptable form in which fats can be introduced into the body is in cream, in grains like corn or oatmeal, in such nuts as almonds and chestnuts, and in the legumes, as peas, beans, and lentils. When taken in this form fats are easily digested, and, when assimilated, serve to build up the brain and nerves and encourage the nutrition of other tissues. Butter is not an economical fat. The process of digesting butter is essentially a process of unchurning. The housewife, then, wastes her labour in churning the cream, and the butter eater his in unchurning it. Besides, butter is rarely found in a perfectly sweet condition. As ordinarily made, butter will not keep longer than milk, unless kept on ice. Tainted butter is a most unwholesome article. It sets up a process of decay and fermentation in the stomach, and is wholly unfit to enter a human stomach. The same must be said of cheese. The latter article, if eaten at all, should invariably be first cooked. Heat destroys the germs present in cheese, and decomposes the poisonous compounds which it contains.

MEAT INSPECTION ON THE CONTINENT.

It is well known that sanitary legislation, especially in regard to foodstuffs, is more advanced in many continental countries than it is here.

In Belgium, one of the nearest and most enlightened, a complete system of meat inspection was instituted in 1890. One of the regulations states—"1. The Government is authorised to regulate and supervise the trade in foodstuffs, and substances used for the food of man and animals, but only from the point of view of public health, or with the object of preventing imposture and adulteration.

"It can further, but only in the interests of public health— . . . . As regards butcher's meat especially, it must not be exposed for sale or sold unless it has been recognised as fit for food after an expert examination. If fresh meat is in question, this expert examination must take account of the condition of the internal organs."

Regulations are also made, and definite instructions given regarding the inspection of meat imported from abroad.

Most of the continental countries proceed on somewhat similar lines with different variations, and surely we ought not to be behind in protecting the public so far as possible from being imposed on with unwholesome or diseased meat. In Prussia the regulation states—"All animals must be examined before and after slaughter by a veterinary surgeon, or by an Inspector. The latter, however, can only pass judgment in certain definite conditions (which are elsewhere specified), and must call in a veterinary surgeon whenever there is the least doubt." "No animal may be slaughtered or cut up without the approval of the Inspector, and only such parts of the carcase may be used for food as are passed by him. In the case of fresh meat introduced from without, a certificate must accompany it, showing that it has been inspected by an expert." And in Norway—"In every commune where the above laws are in force, all fresh meat exposed for sale for human consumption must be examined by the Municipal Inspector and stamped." The laws referred to are in connection with the establishment of public slaughter-houses.

Imitation Worcester Sauce.—The time is coming when we shall have to examine the labels of our sauce-bottles as carefully as those of our wine. A German at Meiningen is advertising for the recipe of "genuine Worcestershire sauce." Now, Germany is the generous country which sends us "genuine eau de Cologne" in large bottles for 2d., as may be seen in Mr. Chamberlain's museum of Yankee notions and German shoddy; and when the patriotic British grocer offers us Worcestershire sauce at 1½d. a quart, we may begin to smell a German rat. Perhaps when the bottle is uncorked we might do so in reality, for dead rats would be as cheap an ingredient as any other.

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BY ROYAL WARRANT TO HIS MAJESTY THE KING OF ITALY
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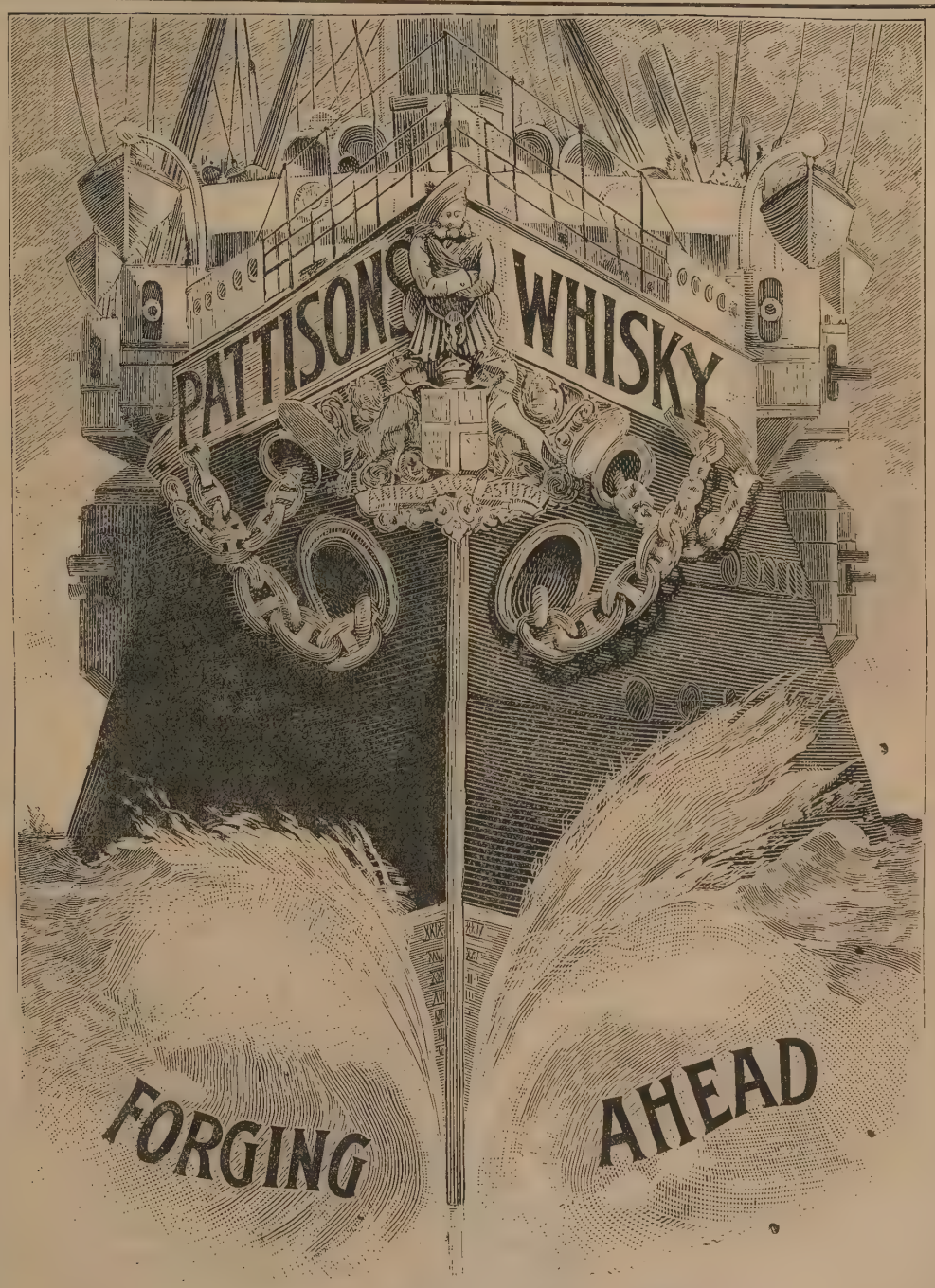

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It has the refreshing properties of fine tea, the nourishment of the best cocoas, and a tonic and recuperative force possessed by neither, and can be used in all cases where tea and coffee are prohibited.

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Food and Health

SUPPLEMENT TO

THE SANITARY RECORD.

No. 13. FEBRUARY, 1898.

A GREAT PUBLIC BOON

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Has commenced making Extract of Beef and Fluid Beef, and is now offering to the Public the

FINEST QUALITY

EXTRACT OF BEEF

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At prices which will place these most valuable articles of food **WITHIN THE REACH OF ALL.**

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LIPTON'S EXTRACT of BEEF and FLUID BEEF are made from the finest quality of Fresh Ox Beef, under the most skilful, scientific, and practical supervision, by a process entirely his own, and contain all its nourishing, stimulating, and strengthening properties. They are invaluable alike to the invalid and the strong. They nourish and fortify the system, and are unequalled for their strength-giving properties.

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It is admitted by everyone that LIPTON caused a revolution in the TEA TRADE, and forced Tea Dealers and Merchants to REDUCE THEIR PRICES. Before LIPTON introduced his celebrated TEAS the PUBLIC HAD TO PAY nearly double the price they are now charged by LIPTON for the Finest Teas the World can produce.

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Samples sent to Medical Officers of Health on application to

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FOODSTUFFS UNDER SCRUTINY.

WHAT TO EAT AND DRINK, AND WHAT TO AVOID.

"SANITARY RECORD" ANALYSES.

IMPORTANT ANNOUNCEMENT.

Owing to the growing popularity of this feature of our "Food and Health" Supplement, we have found it necessary to make arrangements whereby, in future, much fuller reports will be given of proprietary articles than have appeared hitherto. It has been our custom to solicit samples of articles for investigation from the manufacturers direct, unconditionally; but in future such samples as we receive from the proprietors thereof will require to be accompanied by a declaration that the sample is selected from stock, and not put up for the special purpose of analysis. Failing this we shall make the purchases ourselves, selecting the articles at random from the various retail establishments where they are sold.

We have retained the services of Mr. C. G. Moor, M.A., to examine and report on the various substances submitted to us.

All such analyses may of course be quoted as having appeared in The Sanitary Record, but the date must be given, and Mr. Moor's name must not be quoted for advertising purposes without special permission.

"Oxine."

"Oxine" Limited, Wholesale Depot, 29, Walbrook-street, E.C.

I have examined the sample of "Oxine" (in jelly form) with the following results:—

Moisture	42·0	per cent.
Mineral Water	7·5	,,
Albuminoids	42·0	,,
Carbohydrates, &c. ...	8·5	,,
	100·0	

The mineral matter contained ·86 per cent. of phosphoric acid (P_2O_5), calculated on the original sample.

Microscopic examination of "Oxine" showed the presence of muscular fibres of meat and vegetable structures.

This preparation is sold in two forms, the jelly being put up in vacuum jars, and in tablets. In the latter form its extreme portability should recommend it to all travellers, while the jelly form sold in jars is also highly concentrated, seeing that it contains 58 per cent. of solid matter.

The preparation is quite free from poisonous metals, and very palatable. It is a novel and very valuable one, possessing features that distinguish it from the host of meat extracts and fluids that are offered to the public.

DISEASED AND UNWHOLESOME MEAT.*

By T. Robinson.

Continued from January.

Bad meat may owe its unwholesome quality to a variety of causes, and may in various ways answer to the description set forth at the beginning of this article.

"Discoloured" or "stained" flesh may be met with in any part or organ of the body, such as the heart, lymphatics, liver, muscles, pleura, peritoneum, &c., and is due to such diseases as advanced pleuro-pneumonia, septic, inflammatory (*e.g.*, parturient) fever, swine fever, erysipelas, &c. On cutting through a muscle of a recently killed—previously supposed to be healthy—animal, it is not uncommon to see it of various hues of red, from pale to dark, showing most distinctly that changes have already taken place in such muscle. Then, again, the heart and endocardium, or kidney, may be distinctly blood-stained to some depth into their tissue. This is positive evidence of the animal having suffered from a septic disease, such as swine fever.

"Unbled"—or only partially bled—meat, as I have already said, is of a dark-red colour, sticky and soft to the touch, does not set well, and yields a thickish, sticky, and dark juice. This is the condition of things one would expect to find in animals that have died, or been drowned, or suffocated.

"Unbled," "stained," or "discoloured" meat, therefore, is all to be condemned, whether it is fat, lean, or fairly nourished; and why? Although such diseases as pleuro-pneumonia, septic, inflammatory, parturient, or swine fever, may not be directly communicable to man, yet these fevers undoubtedly bring about such changes in the flesh as to render it a suitable medium for the growth of bacilli or the formation of ptomaines, and under such conditions this meat might become highly poisonous in the short space of a few hours.

"Unbled" meat is often that of a diseased animal that has died before the butcher has had time to "finish it off;" in such a case, it is possible the disease may be one readily communicable to man. But any "unbled" meat soon decomposes, and, in addition, is one of the best media for the growth of bacilli, either pathogenic or non-pathogenic. The peculiar, and frequently evil, odour of such flesh is best observed on a skewer that has been plunged deeply into its substance.

Pork, without any observable deleterious qualities, acts on many people almost like a poison. This may be due to the more rapid decomposition of pig-flesh, and hence the early formation of ptomaines, or the growth of a special pathogenic bacillus, as described by Klein in the Welbeck Disease, in 1880. It is therefore essential that pig flesh should be more carefully watched than any other kind of meat.

At Welbeck, in 1880, seventy-two persons were extremely ill, and four died, after eating some boiled ham. At Middleburgh, Holland, in 1887, 256 soldiers and thirty-six citizens were taken ill after eating meat from a cow killed whilst suffering from puerperal fever. Gärtner records a large number of cases of persons who were poisoned by

* *Quarterly Medical Journal.*

eating the flesh of a cow that had suffered for two days from diarrhœa. The symptoms of ptomaine poisoning are well known; briefly, they are—gastro-intestinal irritation, nausea, vomiting, pain in epigastrium, and diarrhœa, which may be almost choleraic, followed by collapse, and often death.

"Emaciated" meat, from whatever cause, either disease or old age, is innutritious, and therefore not of the "nature and quality demanded by the purchaser." Such meat should certainly be condemned, and it should be remembered by the public that there is always danger of poisoning in eating such meat, however well cooked or "seasoned" it may be.

The chief symptoms of swine fever (also called "hog cholera," "typhoid of swine," "purples," &c.) are diarrhœa and broncho-pneumonia, with extravasation of blood on the skin, chiefly behind the ears, on the limbs, on the under-surface of the abdomen, and some few on the back; after death these extravasations are found to extend down through the skin and subcutaneous tissue to the muscle. Extravasations are also found in the lymphatics (lumbar chiefly), heart, and kidneys, and also sometimes in the muscles. As the case advances the bowels ulcerate. Up to the present time swine fever has not been known to affect human beings, and so in the very early stages it is advocated that the meat should be passed as fit for food. The flesh of pigs that have suffered for some time is pale, wet, flaccid, and has a peculiar odour. This must unquestionably be condemned. In the more advanced cases the blood often undergoes a change in colour, to a darker tint, and may become almost "tarry." This would naturally give the meat a darker, or even a purple hue. Owing to the compulsory notification of swine fever to the Board of Agriculture, most of the carcases of swine-fever pigs are confiscated, but in spite of all precautions many find their way into the "slink" markets, and thence in all probability into the sausage machine.

It would be as well, perhaps, before leaving this subject, just to mention that the superficial burning of pig's skin by lime in cattle trucks and the so-called "diamonds" must not be mistaken for the extravasation of swine fever. Careful examination by the professional eye will distinguish the burn in its early stages, and in the case of "diamonds" the history—of very sudden and general appearance—of the comparatively good health of the animal, and the character of the patches, of varying colour and for the most part diamond-shaped, will generally be sufficient evidence on which to form a diagnosis. Of the exact nature of the disease "diamonds" very little is known, except that it is due to a blood change, and the flesh must be judged on its merits.

Parasitic diseases also must be considered.

Liver fluke (*Distoma hepaticum*), commonly known as "rot in sheep," is shaped like a fluke fish, from whence, no doubt, it gets its name, and measures from 1in. to 1½in. in length, about half its length in breadth, and from $\frac{1}{16}$in. to $\frac{1}{8}$in. in thickness. It inhabits the bile-ducts, is commonest in sheep, but is also found in oxen. It causes blocking in the bile-ducts, destruction of the liver substance, and wasting of the liver, diarrhœa, jaundice, falling off of the hair, and general dropsy and emaciation. The flesh has to be judged on its merits, but the liver must most certainly be condemned. The Scotch shepherds eat flukey liver, and say it does them no harm; unfortunately, there are not enough necropsies of these brave shepherds to confirm or refute their statements.

Measles in pork (*Tænia solium*) is due to the cysticercus cellulosæ being disseminated in the liver, muscles, connective tissue, brain, &c., but not in the fat. The cysts are on an average the size of a pea, and are noticeable during life beneath and on the sides of the tongue. Hooklets can be obtained from the cysts; and some cysts may have undergone calcareous degeneration. All measly meat must be condemned, as this cysticercus is one of the two phases in the life of the *tænia solium*, which latter is developed from it in man.

Trichina spiralis is a nematode that affects the muscles of pigs and other animals in the form of an ovoid cyst just visible to the naked eye. Its demonstration is made easier if a small portion of the muscle is first treated with liquor potassi, for the cyst then becomes more distinct, and the worm more easily seen with a magnifying glass. The miniature worm is coiled up in the cyst, and is about one-thirtieth inch long. This disease is transmissible to man, and all meat affected by it must be condemned.

Strongylus filaria is a nematode found in the lungs of sheep and lambs, but is not a common affection in England. It is a slender worm, reddish-brown in colour, and about an inch long. It causes during life much bronchial irritation and a husky cough. The lungs (*post mortem*) show numerous small nodules throughout their substance, yellow in colour, about the size of a pin's head—some hard and almost calcareous, others softer, and others again surrounded by a small quantity of thin pus. The worm is easily demonstrated under the microscope after squeezing one of these nodules on a cover-glass. This parasite is not known to affect any other organ than the lungs, and has not been found in man, so that the lungs must be condemned and the meat judged on its merits. The lungs of a sheep recently seized and condemned by the Health Department in Nottingham, on account of extreme malnutrition, were found to be thickly studded in all parts with this nematode.

Anthrax and actinomycosis are the only two other diseases I shall mention.

Malignant pustule, splenic apoplexy, or splenic fever was the cause of thirteen deaths of human beings in England during 1895—eleven males between the ages of ten and sixty-five, and two females between the ages of fifteen and forty-five. This disease is uncommon, but at the same time rapidly fatal in all animals. The chief signs are: enlargement and congestion of the liver, spleen, kidneys, and lymphatics; the spleen is especially large, soft, and dark. Extravasations of blood are not infrequent.

The bacillus of anthrax being pathogenic, and the spores very hard to destroy, it is absolutely essential that the flesh of animals suffering from this disease should be destroyed by fire.

Ray-fungus, or actinomycosis, although not very common in England, is found in Norfolk and other parts; it is also known by the names of "wooden tongue," "lumpy jaw," and chiefly affects oxen. It is generally found about the head and neck of the animal, and, in most cases, one side of the

tongue and one ramus of the jaw are affected, hence its name. This fungus is pathogenic, and the spores are very resistant to heat, requiring according to Wurtz, fourteen minutes' boiling to destroy safely.

There is no separate return of deaths from this disease by the Registrar-General, but I am of the opinion that it is of much more frequent occurrence than is generally supposed. It is desirable that every medical man should examine carefully the pus of any abscess he cannot otherwise explain, for granules about the size of a millet seed and of a canary colour—those of the ray-fungus.

In conclusion, I can only hope that these imperfect notes may interest some few who are interested in the subject, but have not much time to devote to its study; and I have to thank Dr. Boobbyer, of Nottingham, for the many facilities given me for inspecting condemned meat in that town.

HORSE FLESH AS FOOD.

The prejudice against horse flesh as food is one that time and experience are fast dissipating. In France and other continental countries the use of this aliment is increasing so rapidly that great attention is given to the fattening of horses for the market. It is conceded that the flesh of these animals is most excellent and nourishing. Liebig, Mohschott, and other chemists have demonstrated that the muscles of horses contain a greater percentage of albumen than those of oxen and cows. Smoked horse tongues are acknowledged to be more delicate than those of the now extinct buffalo.

Horse tea is recommended to invalids as possessing greater tonic potency than beef tea. It is more savoury and nourishing. The broth is of the colour of chicken bouillon. As soup stock it has the taste of that made from game, and the same quantity of solid produces a larger quantity of liquid. Hippic meat requires a longer time to cook. When boiled it is apt to crumble; when roasted it is said to suggest venison. There is no part of the horse that cannot be utilised. Inferior portions may be employed in ragouts, whose flavour is much more piquant than when made from corresponding cuts of beef or mutton. The colour of the meat when roasted or boiled is darker than that of the ox. As the grain is shorter and more brittle greater skill is required in the carving. The decreasing use of horses as beasts of burden, through the employment of mechanical modes of propulsion, suggests the value of considering them seriously as an article of food. Every year there is more or less of a panic in regard to the short supply of beef. The horse, accorded the same care in selection and preparation for market, offers an entirely satisfactory substitute. Margarine has kept the price of butter within reasonable limits. Would not a general use of hippic meat be an equally effective check upon the cost of beef? The pot-au-feu, which is no longer boiled in thousands of French homes, on account of the cost of beef, through the cheapness of hippic tissue, has assumed its former importance in the domestic economy of that people.

DANGEROUS MILK SUPPLIES.

In the course of his annual report Dr. Karkeek, Medical Officer of Health, Torquay, remarks:—"In my annual report for 1894 I drew attention to the urgent necessity for townspeople being empowered to exercise supervision over the farms, &c., which supply them with milk; in other words, that the consumer should have control over the producer and distributor. Year by year my experience tends to convince me of the importance of this question. During the past year the following facts corroborate this view. An epidemic of scarlatina was in full swing in a village whence large quantities of milk, &c., were sent to Torquay. Fortunately there were on the spot some very intelligent farmers who had large financial interest in the milk business, and they carried out all my suggestions, and saw to the exclusion of the labourers living in infected houses from attending to the cows or milk. But things might have been very different with a different result. In another case I ascertained that on a farm some miles from Torquay there was scarlatina, and that the dairy produce of the farm was sent to Torquay. I at once proceeded to the farm, and found the sick child seated in the living-room common to the whole family. The farmer's wife nursed the child and attended to the dairy, and this part of the house was separated by a door from the living-room, which was constantly being used. There was no attempt at isolation, and consequently it was imperative that such a contaminated supply should be stopped. This was done in respect of Torquay; but I have not the least doubt that it was sent elsewhere. . . . My impression is that towns should have power to ascertain from milk purveyors whence their supplies are brought; that each farm should be inspected and licensed; and that notification of all infectious diseases should be sent to the Sanitary Authority of the districts where the dairy produce is consumed."

SALE OF FOODS AND DRUGS BILL, 1897.

The Council of the Society of Public Analysts, reporting on the Bill of last session, arrived at the following conclusions:—

"That the Draft Bill introduced by the President and Secretary of the Local Government Board is unsatisfactory, inasmuch as it does not embody the most important recommendations of the Food Products Adulteration Committee, and that, if passed, it would not lead to the removal of the difficulties experienced in carrying out the present Sale of Foods and Drugs Acts.

"That the recommendation of the Food Products Adulteration Committee, subject to but few modifications, should be embodied in any Bill which may be put before Parliament during the coming session.

"That the most important recommendation of the Select Committee, viz., recommendation No. 19, referring to the formation of a Court of Reference, constituted substantially as laid down in the body of the report (with, however, the inclusion in its number of one or more public analysts) should be acted upon, if new legislation is to lead to satisfactory results."

BREAD THE WORLD OVER

VARIOUS FORMS OF THE STAFF OF LIFE IN DIFFERENT COUNTRIES OF THE EARTH.

It is a curious and interesting study to compare the various materials which serve the different nations of the world as the basis of their bread. In this country, where good bread, made from spring and fall wheat flour, is within the reach of all, rarely a thought is given to the fact that, after all, the inhabitants of only a small portion of the earth's surface enjoy such a food.

In the remoter parts of Sweden the poor people make and bake their rye bread twice a year, and store the loaves away, so that eventually they are as hard as bricks. Further north still bread is made from barley and oats. In Lapland, oats, with the inner bark of the pine, are used. The two together, well ground and mixed, are made into large flat cakes, cooked in a pan over the fire. In dreary Kamchatka, pine or birch bark by itself, well macerated, pounded and baked, frequently constitutes the whole of the native bread food. The Icelander scrapes the "Iceland moss" off the rocks and grinds it into fine flour, which serves both for bread and puddings. In some parts of Siberia, China, and other Eastern countries, a fairly palatable bread is made from buckwheat. In parts of Italy chestnuts are cooked, ground into meal and used for making bread. Durra, a variety of the millet, is much used in the countries of India, Egypt, Arabia, and Asia Minor for making bread. Rice bread is the staple food of the Chinese, Japanese, and a large portion of the inhabitants of India. In Persia the bread is made from rice flour and milk; it is called "Lawash."

The Persian oven is built in the ground about the size of a barrel. The sides are smooth mason work. The fire is built at the bottom and kept burning until the wall or sides of the oven are thoroughly heated. Enough dough to form a sheet about 1ft. wide and about 2ft. long is thrown on the bench, and rolled until about as thin as sole leather, then it is taken up and tossed and rolled from one arm to the other and flung on a board and slapped on the side of the oven. It takes only a few moments to bake, and when baked, it is spread out to cool. This bread is cheap (one cent a sheet); it is sweet and nourishing. A specimen of the "hunger bread" from Armenia is made of clover seed, flax, or linseed meal, mixed with edible grass. In the Molucca islands the starchy pith of the sago palm furnishes a white, floury meal. This is made up into flat, oblong loaves, which are baked in curious little ovens, each oven being divided into oblong cells to receive the loaves. Bread is also made of roots in some parts of Africa, and South America. It is made from manioc tubers. These roots are a deadly poison if eaten in the raw state, but make a good food if properly prepared. To prepare it for bread, the roots are soaked for several days in water, thus washing out the poison; the fibres are picked out, dried, and ground into flour. This is mixed with milk, if obtainable, if not, water is used. The dough is formed into little round loaves, and baked in hot ashes or dried in the sun.

PORK AS FOOD.

THE TWO PARASITIC EVILS DEVELOPED IN THE TISSUES OF HOGS.

The prejudice against the flesh of swine as human food is as old as history. If it has any foundation in nature besides the filthy manner in which the hog is generally kept, it is because the hog is more subject to disease, or at least to a certain class of diseases, than other domestic animals. Its omnivorous appetite makes it liable to certain diseases from which the exclusively vegetable-eating animals are comparatively, if not entirely, exempt.

The two evils most complained of are tapeworm and trichina—both parasitic. Both of these are developed in the animal tissues, and it is very doubtful if they ever afflict animals that do not eat animal food, or in some way get animal products into their stomachs and intestinal canals.

The tapeworm, when encysted in the tissues of the hog, has the name of measles—though wholly unlike measles in the human species; the pork containing these encysted worms is known as "measly pork." When taken into the human stomach, they are liable to develope there in the form of the loathsome creature known as tapeworm. This is not necessarily fatal, but very annoying. In modern times, it is successfully removed by the skilful physician without pain or injury to the patient.

TRICHINA

is a parasite much more to be dreaded even than the tapeworm. It is liable to infect the human system in such numbers as not only to be very painful, but fatal, and we believe there is no known remedy. It is encysted in the flesh of the animal, in a dormant state, like the tapeworm. When the trichina enters the human stomach, it attaches itself to the mucous membrane and there awakens to all the activity of breeding thousands, if not millions, of its kind. These young trichina at once start out to find a place in which to encyst themselves for a dormant rest and await a resurrection by having the flesh in which they are imbedded eaten by some animal, brute or human, when they will repeat the *rôle* of their progenitors.

It is when passing from the stomach and intestines to the muscles that the trichina give such pain, and frequently cause death. Pushing their way through the tissues, they cause great irritation and inflammation, resulting in death when the effects become unendurable. While in this active state of migration, seeking a home, they are as liable to be found in one class of tissues as in another. Hence, lard that has not been exposed to a heat of at least 212 deg. Fah. is just as likely to contain them, if the animal was killed when the trichina were in a state of activity, as in any other part or product of the hog.

THE ONLY WAY TO AVOID THE EVIL

and suffering from tapeworms and trichina is to either wholly abstain from eating pork, or to be sure that it is thoroughly cooked so as to destroy the vitality of the encysted parasite. The muscle of the hog makes exceedingly palatable food, and many enjoy eating the fat. In spite of all the terrors and drawbacks, pork is a common and popular article of food. So long as animal flesh

continues to be eaten by man, we presume pork will be eaten. As there is no cure for one of the diseases imparted by it, the safety of the public health demands that hogs be kept in a cleanly manner, fed only on vegetable food and such animal products as belong to the dairy, and that the meat—of all kinds, as for that matter—shall be sufficiently cooked to destroy all animal life. Nothing less than subjecting every particle of it to a heat of at least 212 deg. will do it.—*Health.*

THE VALUE OF EGGS AS A FOOD.

Would it not be wise to substitute more eggs for meat in our daily diet? About one-third of an egg is solid nutriment. This is more than can be said of meat. There are no bones, no tough pieces that have to be laid aside. A good egg is made up of ten parts shell, sixty parts white, and thirty parts yolk. The white of an egg contains 66 per cent. water, and the yolk 52 per cent. Practically an egg is animal food, and yet there is none of the disagreeable work of the butcher necessary to obtain it. Vegetarians use eggs freely; and many of these men are eighty and ninety years old, and have been remarkably free from sickness. Eggs are best when cooked four minutes; this takes away the animal taste which is offensive to some, but does not harden the white or yolk so as to make them difficult to digest. An egg if cooked very hard is difficult of digestion, except by those persons possessed of stout stomachs; such eggs should be eaten with bread and masticated very finely. An egg spread on toast is fit for a king—if kings deserve better food than anybody else. Fried eggs are much less wholesome than boiled ones. An egg dropped into hot water is not only a clean and handsome, but a delicious morsel. Most people spoil the taste of their eggs by adding pepper and salt. A little sweet butter is the best dressing.

FOOD STANDARDS.

The following food standards have been recommended for adoption by the Board of Health of New South Wales:—

"Milk shall contain not less than 12¼ per cent. of genuine milk solids, of which at least 3¼ per cent. shall be butter fat; the milk solids to be obtained by drying any convenient quantity of the sample on a water-bath for three hours until constant in weight. Then upon substraction of 3¼ per cent. of fat the remainder shall be taken as the coefficient of 'solids not fat,' and shall be at least 9 per cent.

"Butter shall contain not less than 83 per cent. of genuine butter fat.

"Tea shall not contain more than 8 per cent. of mineral matter calculated on the tea dried at 100 degrees Cent., of which at least 3 per cent. shall be soluble in water, and the tea as sold shall yield at least 28 per cent. of extract.

"Vinegar shall contain not less than 3 per cent. of acetic acid ($C_3H_4O_3$) and not more than one-thousandth part by weight of sulphuric acid.

"Spirituous liquors, brandy, whisky, and rum shall not be more than 25 per cent. underproof. Gin shall not be more than 35 per cent. underproof."

FOOD POISONING.

"A saying that is literally true," remarked a physician the other day, "is that setting forth the doctrine that one man's meat is another man's poison. Within a short time I have treated two curious cases of what I may term eruptive indigestion. In the first I chanced to meet the man on the street in the morning. He was apparently perfectly well. At five o'clock I was summoned to his residence. I should not have recognised him, so distorted were his features from the eruption which covered them. Investigation and the future history of the case settled beyond a doubt that the man had been poisoned by cockles, which he had eaten at luncheon, yet the disturbance was for him alone, other members of the family who had partaken of the same dish, feeling no ill results. A fortnight later, another patient of mine came to me with a marked eruption on hands and wrists and between the fingers. A dinner of veal was responsible for the trouble, and again, as in the first instance, the sufferer was the only one affected of the family who had partaken of the meat at the same meal. In each case I found that the tendency to distress from the particular food was known to each sufferer, although never before had the symptoms been so marked or distressing. This is, perhaps, a word of warning to persons who know their poison to abstain from it, particularly when their systems may be from some cause in a non-resisting state."

THE DISINFECTION OF BOOKS.

At a recent discussion of this subject, Dr. John S. Billings, the director of the New York Public Library, said, in part:—"At an investigation made by the State Board in Iowa three years ago it was found that six cases of scarlet fever were undoubtedly communicated through circulating library books. Other diseases may be communicated in the same way. There is not much danger of this from the edges of cards, although they are foul and filthy, and undoubtedly filled with bacteria, more especially with those of skin diseases. In order to prevent any possibility of the diseases through books it is necessary to destroy the bacteria.

"We cannot use the method of applying 210 deg. Fah. of dry heat. That would curl the leaves and injure the bindings. Much less can we apply 212 deg. Fah. of wet heat. We cannot apply a solution of corrosive sublimate or zinc chloride. The fumes of burning sulphur are both inadequate and undesirable.

"Two years ago, when in Philadelphia, I suggested to one of the fellows in the laboratory that it would be desirable to seek a new method. Formaline was known to be a destroyer of bacteria, and he set to work on that. This can be purchased in a drug store, or may be made by burning methyl alcohol. A saucer of formaline, a book which had been infected with the bacteria of diphtheria, another with scarlet fever, and another with erysipelas were placed under a bell jar. The experiment showed that one cubic centimetre of formaline to 300 cubic centimetres of space would thoroughly disinfect any book in fifteen minutes."

MEDICINAL USES OF COFFEE.

It is said that the first use of coffee by man was made by the prior of a convent. He was told by a goatherd of the exciting effects of the berries when eaten by his goats; so he thought he would try them and see if he could not keep his monks awake during what should have been their vigils. He succeeded admirably, and brought coffee into the way of earning its world-wide reputation. The most active principle of coffee is caffein; it contains also certain oils, which no doubt have a share in its action. Many years ago a claim was made that green, or unroasted, berries had a great value in liver and kidney troubles. One enthusiast prefers a mixture of two parts Mocha and one part Martinique and Isle de Bourbon coffee. He puts about three drachms of this in a tumbler of cold water and lets them strain and infuse over night. The next morning, after straining, the infusion is taken on an empty stomach the first thing after getting up. This medical authority cites many cases of kidney and liver colics, diabetes, nervous headaches, &c., which, though rebellious in all other treatments for years, soon yielded to the green coffee infusion. The remedy is a very simple one, and well worthy of a trial. Another use of coffee medicinally is in nausea and retching. For that purpose a strong infusion is made of the berries which have been ground and roasted, and it is sipped while very hot.—*Family Doctor.*

NUTRITIVE VALUE OF MEAT EXTRACTS.

C. V. Voit (*Münch. Med. Wochensch.*, 1897, No. 9), maintains that "extracts" are merely "Genussmittel," stimulants or condiments. Dr. Lauder Brunton considers them poisons if taken in excess, and that though some do contain a variable proportion of nutritive substances as peptones, albumoses, and glykogen, the quantity that can be ingested in these forms is practically insignificant. Only the peptonised meats can be considered foods, and Leube's alone consists of soluble myosin, without any admixture of the comparatively useless gelatin, or of mere "extractives," which are but waste materials of the creatine series.

VEGETARIANISM AND QUEEN ELIZABETH.

The editor of the *Lancet* has been favoured with a letter from a lady who uses "Stella" as a pseudonym, and who denounces him as blood-thirsty and indecent because he does not, on the one hand, espouse the cause of vegetarianism, while on the other he neglects to insist upon the employment of women only to attend upon sick women. Our contemporary's rejoinder will, we imagine, hardly propitiate "Stella":—Our correspondent is terribly in earnest, but in her anxiety to get in her telling blows she leaves herself a little unguarded. Can we deny, she asks, that tuberculous meat is a source of danger? No, we cannot; but can "Stella" deny that milk is also a vehicle of tuberculous infection? and milk, we fancy, is an important constituent of the vegetarian diet. Can we contradict her, she asks, when she states that women are competent to wait on suffering women; and if not, why do we not put aside our intolerance and denounce "the gross impropriety of male ministration?" To this we would remark—regretfully—that it requires a nasty mind to see the impropriety that is so gross in "Stella's" opinion; and that to insist upon every woman having a woman to attend upon her would be a very intolerant proceeding, for some of "Stella's" suffering sisters might prefer the services of the opposite sex. Finally, "Stella" asks us to "look at Queen Elizabeth!" Despite its abruptness this may not be an inconsequent request, though we cannot see its bearing. We make no claim to a perfect knowledge of historical matters, but if "Stella" is meaning to adduce Queen Elizabeth as a proof that a woman can make a good ruler, we think a better example could be found in times that are nearer to us. And if "Stella" means to imply that Queen Elizabeth was a successful monarch because she was a vegetarian, we escape all discussion of the deduction by denying the premise. Putting aside the particular case of Queen Elizabeth, imagination staggers in the attempt to realise the reign of a queen whose policy should be swayed by her vegetarianism. We recommend the theme to Mr. W. S. Gilbert.

Novel Way of Preserving Meat. — Anyone who has ever picked up with a bare hand a piece of intensely cold iron, knows that the touch burns almost as badly as if the metal were red hot. Indeed, the action of great heat and that of extreme cold are so familiar that a Hungarian chemist has turned the latter to account to prepare meats for food. He subjects the meat to 60 deg. of frost and then seals it up in air-tight cans. The result is that the meat, which is practically "cooked by cold," will keep any time, and can be eaten with very little further preparation.

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Food and Health

SUPPLEMENT TO

THE SANITARY RECORD.

No. 14. MARCH, 1898.

FOODSTUFFS UNDER SCRUTINY.

WHAT TO EAT AND DRINK, AND WHAT TO AVOID.

"SANITARY RECORD" ANALYSES.

IMPORTANT ANNOUNCEMENT.

OWING to the growing popularity of this feature of our "Food and Health" Supplement, we have found it necessary to make arrangements whereby, in future, much fuller reports will be given of proprietary articles than have appeared hitherto. It has been our custom to solicit samples of articles for investigation from the manufacturers direct, unconditionally; but in future such samples as we receive from the proprietors thereof will require to be accompanied by a declaration that the sample is selected from stock, and not put up for the special purpose of analysis. Failing this we shall make the purchases ourselves, selecting the articles at random from the various retail establishments where they are sold.

We have retained the services of Mr. C. G. Moor, M.A., to examine and report on the various substances submitted to us.

All such analyses may of course be quoted as having appeared in THE SANITARY RECORD, but the date must be given, and Mr. Moor's name must not be quoted for advertising purposes without special permission.

"D. C. L." Malt Extract.

I HAVE duly examined the sample of malt extract prepared by The Distillers Company, Limited, of Edinburgh. My results are as follows:—

Maltose	52·5
Dextrin	13·6
Albuminoids	7·4
Mineral matter	1·9
Water (diastase, &c.)	24·6
	100·0

The sample was absolutely free from poisonous metals.

The mineral matter contained ·34 phosphoric acid, calculated on the original sample.

The value of a malt extract depends largely on its diastatic power, which in the case of the present sample is very considerable. This fact, coupled with the very palatable character and purity of this product, places it in the first rank among similar preparations.

Hay's Food for Infants and Invalids.

I HAVE duly examined the sample of Hay's Food for Infants and Invalids (prepared by William Hay, Manufacturing Chemist at the Hygiene Flour Mills, Hull), with the following results:—

Moisture	8·1
Carbohydrates, &c.	74·8
Albumenoids	13·7
Mineral matter...	1·3
Fat	2·1
	100·0

The mineral matter consists of the phosphates of calcium and potassium. About 13 per cent. of the food is soluble in cold water, and after examining the matter insoluble in cold water by the ordinary acid and alkali treatment there was no insoluble fibre.

Its absence is important, as there should be no irritating particles in a food intended for infants.

The flavour of the food is very good, and when prepared according to the directions on the tin it should be readily assimilable and of high nutrient value.

THE MEAT SUPPLY OF PARIS AND ITS INSPECTION.

By EDWARD CONNER.

THE meat trade is indeed the most important alimentary industry of Paris. Its operations are vast, yet the organisation is, relatively speaking, not complicated. Paris requires annually 83,000 tons of beef, 38,500 of mutton, and 18,330 of veal. It is besides supplied with 22,000 tons of pork, but the pork dealers or *charcutiers*, numbering 1100, are not accepted as butchers; besides, they have their own separate guild. The total number of butchers in Paris is 2517; they are divided into three classes—wholesale, demi-wholesale, and retail. The butcher who buys the fat cattle on foot, kills and dresses the meat, is a wholesale butcher or *chevillard*—so-called from the name of the iron hooks in the hall from which he suspends the carcases to cool and acquire an initial firmness. There are 287 of these wholesale butchers. Custom has established three categories of beef, and two for mutton and veal. It is expected that the two halves or moieties of the carcase of an ox, or net meat, will cover the

cost of purchase; the fat and the offal, known in Paris as the "fifth quarter," constitute the profits of the wholesale butcher. Except for pigs, stocks are not purchased by weight as a rule; the buyer relies on his skill and experience. As the trade in all its grades is entirely free, it is impossible to gauge a butcher's gains. However, a few in the year become bankrupt, so the business has its drawbacks. A farmer can kill his own meat and send it for sale to Paris, but as a rule that practice is not adopted. Meat can also be sold by costermongers in the streets during certain fixed hours of the day. In every case the sanitary inspection of meat throughout the city is very rigid.

La Villette is the Paris Smithfield cattle market. Though open daily except Sunday, Mondays and Thursdays are the principal sale days, and the hours between ten and three o'clock. Since the protectionist decree of 21st February, 1895, no American cattle are admitted into France; she can supply her own wants, chiefly at the weekly fair of Cholet, situated between Anjou and Vendée, and known as the "beef granary" of France. The cost of transporting a fat ox from La Plata to La Villette is 140f. La Villette received in 1895, 293,610 head of cattle, of which 3771 were foreign; 166,734 calves; 1,667,862 sheep, of which 422,097 were foreign; and pigs, 431,846, of which 2352 were imported. But all the live stock arriving at La Villette are not destined for Paris wants; the northern and eastern cities of France also draw a good deal of their supplies here. German sheep are not considered so good as formerly; those from Hungary are too fat. However, mutton being so dear of late, housekeepers buy less. South American cattle are ranked as inferior, and, being cheap, are purchased mostly for the use of the French army. Holland contributes small pigs, between 1½ cwt. and 2 cwt., but which are not in demand. The system now coming into use at La Villette is to pay ultimately for the beast according to the price the dressed meat will realise per lb., offal excluded. Thus, say, a fat ox is purchased per live weight at 140f. per 100 kilos., or double hundredweight, the exact cash down will be based on what the four quarters net will realise. Calves and sheep are always thus sold, but the price for pigs is lumped on foot.

There are about 287 wholesale, and 2230 demi-wholesale and retail butchers in Paris. The La Villette abattoir employs a total of 2562 hands, of whom 142 are women. It possesses 209 slaughter-houses, or *échaudoirs*, each capable of preparing five carcases per day; any butcher can rent one, kill his own cattle, and retail the meat in his own shop. Before entering the slaughter-house, the animals are again examined; it is thus that 1120 were rejected in one year. The custom is for the wholesale butcher, after the carcase is dressed, to have its halves or moieties transported into a vast cooling hall, to allow the meat to become firm—a matter of six hours. Each lot of meat is numbered with a docket, and is next inspected by the veterinary surgeon. If found to be sound he stamps the meat with a "V"—which means *vu*, proof of his examination—in blue colour. If any be insalubrious it is rejected, some is retained for the tenants of the Zoo, the rest is sprinkled with petroleum and delivered at the knacker's yard for industrial purposes. The meat is next weighed, replaced on the hooks or *chevillards*, with a docket pinned thereon setting forth its weight. The public sales then commence; the retail master butchers select what is best, and at a price debated with the owner or wholesale butcher, the conditions being registered by a clerk at the same time. All cattle entering the La Villette market, which adjoins the abattoir, must pay a tax down before it is allotted standing space; the charge for cattle is 10f., calves 12f., sheep 15½f., and pigs 8f. per 100 kilos., or double hundredweight (live weight); there is also a small tax per head for sanitary inspection and cleansing the markets. The octroi dues are included in these tolls. If any animal be unsold, such are viewed as being only *in transitu*, and have but to meet a board and lodging tax. After the big butchers make their purchases in the cooling room, the rank-and-file strike in; they generally buy secondary meat, or joints specially cut up, but not weighing less than 16 lb. The total number of salesmen—not guaranteed as to solvency—is 115, of whom 49 for cattle, 15 for calves, 32 for sheep, and 19 for pigs. Their commission varies per head—cattle 3f. to 5f., calves 1½f. to 2f., sheep 30c. to 50c., pigs 75c. to 2f. The value of all the sales in a twelvemonth amounts to 281 million francs.

There are 245 special vans, which are the property of an independent company, for the delivery of the meat to the large purchasers. Painted on the outside is the weight of the vehicle, and the *brut* weight it can load up to. Arrived at the exit gate of the abattoir, the cart passes over a weighbridge, when the tax inspectors register the weights. The toll is 9f. 73c. per 100 kilos. of meat, plus 2f., per same weight for the right of slaughtering. All this taxation is, of course, municipal, and includes a fractional levy to defray the cost of the erection of the market and abattoir. The branch abattoirs where all animals entered must be killed, are conducted on the same lines as that of La Villette, save that only cattle, sheep, and calves are killed at that of Grenelle, pigs exclusively at Fourneaux, and cattle and horses at Villejuif.

There is another important department of the dead meat market at La Villette, outside of what may be called the Cooling Hall sales, and known as the *marché du réassortiment*. It is fed by deliveries of slaughtered meat from the ordinary *échaudoirs* from the suburban butcheries, from consignments from the provinces and foreign importations. Switzerland in 1895 sent 12 tons of sirloin beef, and that realised 10½d. per lb. The total supply of this dead meat sold in a year was 5218 tons, most of it having been received during the months of May and July; of this, 3951 tons were beef, 723 tons veal, 538 tons mutton, and 7 tons pork. The meat on its entry is inspected —6 tons were rejected in one year as being unsound — weighed, and docketed, then struck with a storage or stall tax of 2f. 10c., plus 20c. per same weight, for cutting up. The direct meat consignments having entered Paris, paid the octroi dues at the fortifications, the rest at the abattoir. There are twenty-one salesmen for this special branch. The buyers—mostly small butchers, and second and third-class restaurant keepers—have to bring away their purchases themselves.

But the Halles Centrales are the great wholesale

dead meat market, and which is held in pavillons 3 and 5. It has no connection with the kindred market at La Villette, except that the abattoirs send meat to be sold here. The sales, whether by private bargain or public auction, take place in summer and winter, at five and six o'clock in the morning respectively. The auctioneering ceases when there is no more meat to sell, and that by private bargain, at eleven. All the meat is weighed and inspected—250 tons of meat in 1895 were condemned as being unsound—one hour before the opening of the market. The provinces and foreign countries supply 73 per cent. of all the meat sold here; the abattoirs, 16; town butchers who buy to re-sell, 7; and the suburbs, 4. The total toll for meat leaving the abattoirs is nearly 11¾f. per 100 kilos. If the meat be sent to the Halles Centrales, it is submitted to a further tax of 2f. 30c. per 100 kilos. This impost yields 984,016f. yearly. In a word, one-third of all the meat entering Paris is sold at the Halles Centrales, and which amounts annually to 38,000 tons. Of this quantity, 2000 tons were strictly imported, 375 from Switzerland, and 11 from Australia. The average price per lb. obtained for the beef was nearly 11½d., and for mutton 1s. 1¾d. of the total sales, 82 per cent. was disposed of by private bargain, and 18 by public auction. In summer especially, 2 per cent. of the choicest morsels are purchased for the seaside resorts. There are sixty-two *mandataires* to conduct the sales. The German and Swiss meat railway vans have false sides to admit of being filled with ice in warm weather. It is the Great Northern Railway Company of France that transports the slaughtered sheep from Berlin and Magdeburg; over the German lines only the carcases are carried by fast trains. On arriving at Jumont, on the French frontier, the mutton is inspected by vets.; 300 carcases can be thus dealt with in eighty minutes. It costs 37f. per ton of carcases from Jumont to Paris. The train arrives in the morning at four o'clock; some butchers purchase direct from the railway wagons, and thus economise the toll at the Halles Centrales, to where the bulk of the meat is sent—about two-thirds of the consignment. Frozen mutton from Argentina is landed at Hâvre, where a little of it is consumed, as also at Rouen and Dunkerque, but the bulk is forwarded on to Paris. The entry duty on Argentina mutton is 13f. 50c. per 100 kilos., while that on German carcases is but 4f.

The consigners of alimentary products from the provinces have had a long-standing grievance against the salesmen of the Halles—and known as *Commissionnaires* and *facteurs*—respecting the vending of their consignments; the charges were excessive, disproportionate to remittances, and the latter unpunctual, or worse. All that has become ancient history since the new regulations have just come into operation, and whose working is under the control of the Prefect of Police. Henceforth, every commodity sent for sale must be sold in the pavillon especially allotted to such, but cannot be admitted if below a minimum quantity. In other words, only wholesale and demi-wholesale transactions will be tolerated. There is but one category of salesmen now recognised here, who are known as "*mandataires*." A list of candidates for this function is registered at the Tribunal de Commerce; if the applicant is accepted—the number is limited—he will receive a certificate or licence. The list of *mandataires* is always free for public inspection; if a member be guilty of any dishonourable conduct the Prefect of Police can demand his dismissal. After hearing the accused, the Tribunal can definitely decide for his name being struck off the register. No *mandataire*, even when chosen, can act till he possesses a booth or stand in the pavillons for the meat sales, and deposits a *bonâ fide* security for 5000f. at least, and augmenting each year following the importance of his business. The *mandataire* is bound to strictly follow the instructions of his customer. All sales must take place strictly within the pavillons; proceeds to be remitted on the day of the sale even, or the next day at latest, to the sender, unless a special arrangement exists otherwise. The *mandataire* must be present at all sales, and cannot be replaced by another colleague. He is free to accord, at his own risk and peril, credit to buyers, but must all the same remit immediately to his client full amount of sales. Out of these proceeds will be deducted certain market charges following the published tariff, but rate of commission is optional between the *mandataire* and his customer. The farmer must record the details of his sales, as to amounts realised and names of purchasers. The authorised agents of the Prefect of Police are to have free access to examine the records, in case of any dissensions between customers and salesmen. It is evident that there can be no fraud; they are the officials of the Municipality—who have no connection with the Custom Officers—that levy the dues for the octroi, on live stock, and dead meat entering the capital, as well as the charges for the *réassortiment* or morselling of the meat, either for purchase by private bargain or by public auction. The client is aware what the transport of his meat will cost by rail, &c., to the Halles Centrales, and the tariff of market tolls; he is left free to arrange with the salesman as to fee for commission; the latter is bound to follow implicitly the instructions of his client, to remit account and proceeds of sales within twenty-four hours, and the client can claim to inspect the register of the sales of the *mandataire*, who in case of dishonesty risks his certificate, while for non-remitting, his surety deposit of 5000f. can be impounded till the liability be paid in full.

UNTOWARD EFFECT OF EATING RAW STARCH.

Dr. L. Kahn reports in the American *Therapist* the case of a girl aged 20, in which great anæmia and some heart trouble were coincident with the practice of eating raw starch. Her history for the previous eighteen months was that she started her peculiar habit by taking lumps or pieces of starch from the box as she passed it three or four times daily; this gradually increased till she was using it regularly every few hours with a teaspoon. Her mother noticed the disappearance of the starch and watched for the cause; discovering her daughter's habit she stopped the supply. The starch habit lasted about six months. Then the starch being no longer obtainable she started on flour, first using a teaspoonful twice or thrice daily, gradually increasing till she used two teaspoonfuls every hour when awake. Under tonic treatment, the practice being discontinued, the patient had greatly improved and continued to progress.

DEATH IN MILK.

SOME REVELATIONS ABOUT TUBERCULOSIS

In a recent address before the Cheshire Chamber of Agriculture, Dr. G. Sims Woodhead, director of the Laboratories of the Royal College of Physicians and Surgeons, London, gave some startling details in regard to the prevalence of tuberculosis in the cattle of Great Britain.

Dr. Sims Woodhead said his subject was one which, not only in this country, but in all countries in our northern latitudes, had long occupied the attention of those interested in the prevention of the spread of infective diseases, and they had come to take a true view of the nature of tuberculosis, and were enabled to apply rules by which the disease might be diagnosed and its spread prevented with almost absolute certainty. It was one of the most important subjects with which raisers of stock and dairy farmers had to deal. It was recognised that milk from tuberculous animals had the power of setting up most active tubercular processes. He did not wish to express any alarmist views, but rather to lay down certain well-defined and accepted facts, and they would be in a position to see how many of these cases might be absolutely prevented.

Dr. Woodhead proceeded to detail the features of tuberculous disease as it occurred in man and animals, mentioning that the lungs and intestines were usually affected. These were parts that were from time to time in relation to the outside world, the lungs through the air, and the intestines through the food that passed into them. In regard to milch cows, there were many dangerous cases where the disease was not suspected, and where the udder might be affected without there being any definite sign in the earlier process of the disease. Milk was a diet which in ordinary circumstances was not submitted to processes of cooking. It was

BECAUSE SO MUCH UNBOILED MILK WAS DRUNK

that the danger arose. Dairy cattle should be kept under rigorous observation. It was long supposed that such animals as cats and horses were not liable to contract the disease. This was not so. The horse had been known to contract tuberculosis just as did pigs that were fed with milk from tuberculous cattle. The cat took it as the cattle did, and as older human beings did—through the air. The tuberculosis of children was almost invariably contracted through the intestines.

Treating of the extent to which animals are affected by tuberculosis, the lecturer said that in Copenhagen, where the cattle were stringently inspected, of the cattle killed in the four years 1890—93, inclusive, numbering 132,294 oxen and cows, 23,305, or 17·6 per cent., showed evidence of tubercular disease. Of 8292 pigs, 1272 were tuberculous; while of calves, there were out of 185,765 examined only 369, or less than one-fifth per cent., that showed any trace of tuberculosis. The disease in sheep was exceedingly rare, as out of a third of a million of sheep only one was found to be tuberculous. In the Berlin slaughter-houses similarly inspected 15 out of every 100 cattle were found to be tuberculous. The number of pigs so affected was only 1½ per cent., and of calves only about one-tenth per cent. Whatever statistics were taken, they found the figures were fairly approximate. It was sometimes said that we had not tuberculosis to anything like the same extent in this country, but from personal experience he knew that we had. He had, for example, seen a herd of pedigree stock which was

TUBERCULOUS ALMOST FROM END TO END.

In Edinburgh in 1890, where 300 milch cows had to be slaughtered owing to pleuro-pneumonia, it was found that 120, or 40 per cent., were tuberculous. In one case the cows affected were in the proportion of 83 out of 100. The very small percentage of calves affected would be observable in comparison with cattle and pigs. We were sometimes told that tuberculosis was hereditary. If that were so we might expect to find more calves affected. With regard to the liability of milk or meat to convey tuberculosis to human beings, the lecturer pointed out that the tubercular kernels were found in almost every part of the body. Wherever there was a gland affected there might be tubercular focus. In experiments even with cooked meat, a small proportion of animals fed with it had contracted the disease. If only 1 per cent. were affected, they would represent a vast number of human beings who might contract the disease. The bacilli, however, were not in the meat itself, as a rule, but in the glands and various organs, and in the covering of those organs as they lay in the chest or abdomen. Inspection and cooking were undoubtedly safeguards when well carried out. It was better from every point of view that preventive measures should be taken at an early period. Tuberculous milk was a subject of more far-reaching import. He could not help attributing the affections of glands in the neck which occurred in many weakly children to the consumption of milk from

COWS WITH TUBERCULOUS UDDERS.

He also attributed to the same cause a large number of cases of inflammation of the bowels amongst children. The importance of keeping the sources of milk supply untainted could hardly be over-estimated. He was convinced there could be no tuberculosis without the presence of the tubercle bacillus, and that the disease was transmitted only through the agency of this bacillus, and therefore he was of opinion that heredity in the ordinary sense of the term could account for very few, and practically none, of the cases in either the human subject or animals. Of course, there were cases of congenital disease, but hereditary tuberculosis he did not believe in. Dr. Woodhead said that tuberculosis was preventable, and, if proper steps were taken, would be reduced to a disease of comparatively slight importance. One thing we could do, and that was carefully to keep away from all our dairies or farms any people suffering from tuberculosis. No person suffering from tuberculosis should be allowed to have anything to do with the care of cattle or the preparation, collection, or distribution of our meat or milk supplies. All measures for the maintenance of health in animals were inimical to tubercular bacilli.

Dr. Woodhead, in conclusion, recommended as

principal methods of getting rid of tuberculosis, systematic and regular inspection; the use of tuberculin, in which, he said, they had a diagnostic agent infinitely superior to any ever before at their command; notification, in order that measures might be taken in consultation with those specially interested to do the right thing with the animals, whether to be slaughtered at once or kept under observation, or, in cases of breeding, to see the conditions under which the animals should be kept. There should be isolation in the case of every tuberculous animal, and there should be plenty of ventilation and light in the shippons. The animals should have good food, and be kept under generally

FAVOURABLE HYGIENIC CONDITIONS.

The registration and inspection of dairies would afford confidence to the public. There should be disinfection, and he believed we should have to come to the marking of meat, as in countries abroad. There should be compensation to owners whose animals had to be destroyed. Tuberculosis should be scheduled as infective, and the compensation should come from a fund to which Imperial and local assistance might be given, and the owners should also contribute. He believed that by adopting such measures a series of regulations might be drawn up which would help not only themselves but the whole country.

POINTS IN MEAT INSPECTION.

THE CHARACTERISTICS OF MEAT.

Good meat is of a bright colour, marbled with fat; the flesh of a calf is always paler and less firm to touch; mutton is a dullish red, firm, the fat hard, usually white; but a marked yellowness is consistent with wholesome meat; the flesh of a pig is paler and less firm to touch, the fat is always soft, the carcase should be plump, the skin smooth, not set in folds or wrinkles.

The chief points to which special attention should be paid are: The colour of the exterior of the carcase, called by butchers the "bark," in diseased meat it is very pale, instead of its resembling the colour of a plum; emaciation and wetness of the flesh; soft and flabby condition of the flanks; the inside and outside should be examined; the breast, underneath the arms and shoulders, behind and about the kidney fat, under the skirting, as it is in these situations that dropsical lesions are usually located; evidence of such disease as tubercle is frequently found in these parts; the walls of the chest should be carefully examined, to detect any stripping; the stripping of the pleura or lining membrane of the chest, is practised for the purpose of removing traces of pleurisy and tubercle; also for the purpose of removing the unsightly appearance of the blood in the chest, which is due to over-sticking and accidental pouring into the chest the contents of the stomach and intestines.

If these traces have been removed for the latter purpose only, the underlying issues will be found firm and dry, and of their normal colour, except the rugged portions may be a little stained with blood; if the process has been carried out to remove traces of the disease, the muscles will be found soft and moist, and much paler in colour, and the fat tallowy. This stripping is often done very cleverly, and hot fat rubbed over the walls of the chest, so as to try and hide traces of the disease.

Spencer E. Jones.

TUBERCULOUS POULTRY AS FOOD.

A correspondent has communicated to the *British Medical Journal* a disquieting occurrence which recently befell him. The cook, when she came to dress the Christmas turkey, thought the liver "looked bad," and put it aside. The bird was cooked, and was partaken of by a party of children. Our correspondent found the liver of the turkey (which had been supplied by an important firm) to be "studded all over with tuberculous masses," this diagnosis being confirmed by microscopical examination. On inquiry, he found that the bird had been reared in one of the home counties, where the firm bought annually over 2000 turkeys.

The story is unpleasant, but it is reassuring to know that, according to the present state of knowledge, there is not much ground—though the question cannot be said to be quite settled—for believing that avian tuberculosis can be transmitted to man by ingestion. The experiments of Strauss and Wurtz and of Strauss and Gamaleïa seem to show that birds are almost immune to tuberculosis of human origin. Rivolta and Maffucci have found that tubercle bacilli of avian origin have only slight pathogenic properties in regard to mammals. Koch himself has insisted upon the cultural differences between the two bacilli. On the other hand, we know that Gilbert, Roger, and Cadiot have been able to produce tuberculosis in rabbits by inoculating them with the avian bacillus. The same authors have also shown that hens may, under certain conditions, be infected with the human tubercle bacillus.

These results have been confirmed by Courmont and Dor, Nocard, Delépine, and, we believe, also by Macfadyean. The guinea-pig, which is so easily affected by tuberculosis of mammals, is very resistant to avian tuberculosis, but is not so immune as some believe. We must therefore admit that avian tuberculosis may occasionally be transmitted to mammals. All our domestic birds (common fowls, turkey, guinea-fowl, peacock, pigeon, pheasant, &c.) are liable to it; indeed, epizoötics may occur in poultry yards, and entail serious pecuniary losses. Once a place has been infected the disease becomes enzoötic, and is very difficult to eradicate unless all the birds in the poultry yard are destroyed, and the place thoroughly disinfected.

It is easy to understand this feature of the disease. Birds are usually infected through the alimentary canal; when a bird is tuberculous its excreta after a time teem with tubercle bacilli; the soil, straw, food, water, perches, nests, walls, &c., are rapidly soiled with these excreta, and in this way the bacilli may rapidly find their way into the alimentary canal of any number of birds. Even admitting that there is some danger of the disease being communicable to man, it does not seem likely that it would be communicated by ingestion. When a fowl is "cleaned" previous to cooking, the organs usually

affected with tuberculous lesions (liver, spleen, intestine, peritoneum) are removed more or less completely. A cook would usually have no difficulty in recognising that a liver in a marked state of tuberculosis is diseased, and not fit for food. Birds are usually cooked very thoroughly. It is true that occasionally tuberculous livers may have been prepared for food. Moulé has recorded a case in point.

In a village where fowl tuberculosis was very prevalent, people were in the habit of preparing a paste with livers in an early stage of the disease. They were under the impression that the tuberculous lesions were indications of fatty changes, and, under this impression, they considered that these *foies gras* were great delicacies, and they partook of them accordingly. Indeed, all *paté de foie gras* is under suspicion. Still, admitting the possibility of transmission to man, we must look for danger in another direction.

It is evident that the contamination of the soil and various objects with excreta teeming with bacilli will cause the dust raised from an infected place to be loaded with these. It must be remembered also that the avian bacillus is capable of growing rapidly outside the body. It is not an obligatory parasite, and can be grown on vegetable substances even at a temperature much below that of the body. It is not killed by drying. We know so little of the changes to which this bacillus is liable when growing outside the body that we are as yet unable to say if it is capable of acquiring special virulent properties under these conditions, and whether this dissemination of tuberculous dust constitutes a serious danger to man or some of the domesticated animals. So far we have no clear evidence of the existence of such a danger.

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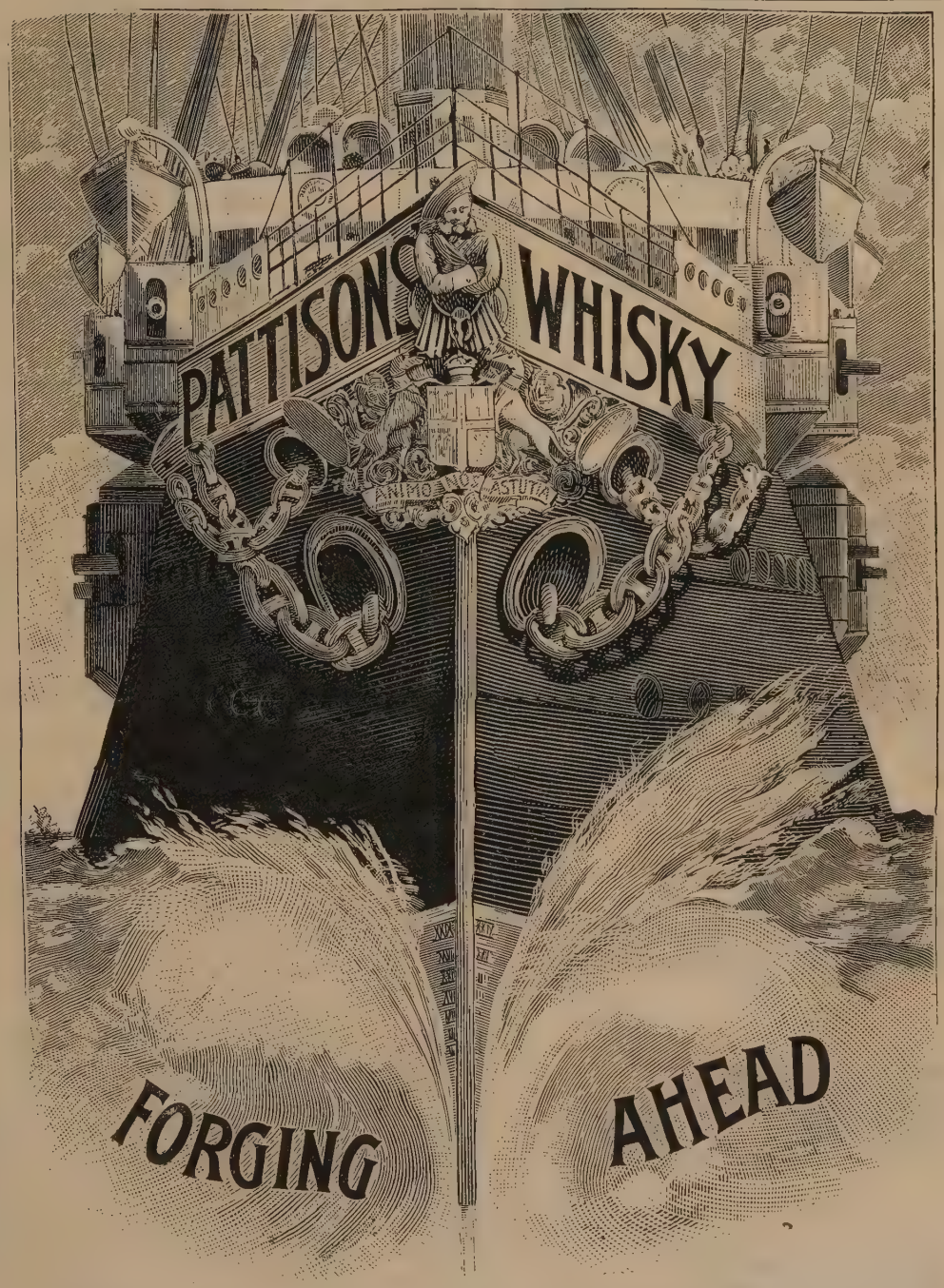

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Supplement to THE SANITARY RECORD, *April 22nd*, 1898.

Food and Health

SUPPLEMENT TO

THE SANITARY RECORD.

No. 15. APRIL, 1898.

FOODSTUFFS UNDER SCRUTINY.

WHAT TO EAT AND DRINK, AND WHAT TO AVOID.

"SANITARY RECORD" ANALYSES.

IMPORTANT ANNOUNCEMENT.

OWING to the growing popularity of this feature of our "Food and Health" Supplement, we have found it necessary to make arrangements whereby, in future, much fuller reports will be given of proprietary articles than have appeared hitherto. It has been our custom to solicit samples of articles for investigation from the manufacturers direct, unconditionally; but in future such samples as we receive from the proprietors thereof will require to be accompanied by a declaration that the sample is selected from stock, and not put up for the special purpose of analysis. Failing this we shall make the purchases ourselves, selecting the articles at random from the various retail establishments where they are sold.

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Carbohydrates, &c. (by difference)	9·8
	100·0

The amount of phosphates (3·7 per cent. of the original sample) is the highest I remember to have found in a similar preparation. The extract is not overloaded with salt, and its flavour is very good. Comparing it with many similar preparations, the nitrogenous matter is higher and the moisture is lower. It is a good extract, and will meet with general approbation.

Vejos.

I HAVE examined the sample of Vejos, submitted for analysis by Vejos, Ltd., with the following results:—

Water...	45·8
Nitrogenous matter...	20·2
Carbohydrates, &c.	24·8
Mineral salts	9·2
	100·0

As a vegetable extract it compares favourably with anything of the kind in the market. It possesses much the same flavour as a meat extract, while its claim to be more economical cannot be gainsaid. Its solubility renders it easy of assimilation, and should commend it to those whose digestive powers are impaired.

TUBERCULOSIS AND THE MILK SUPPLY.

PROFESSOR DELEPINE, of Owens College, Manchester, recently read a paper entitled as above at Keswick. Professor Delépine, in the course of his paper, said that at present there was perhaps, in this country, not a herd of cattle or a cowshed of any size which was free from tuberculosis, and there must be very few milkshops from which tuberculosis milk is not issued at times. Yet there was hardly a class of persons who could be said to be responsible for this state of things. Tuberculous cows were sold and bought, in most cases, without there being even a suspicion of their being tuberculous. They carried with them infections into herds or cowsheds. Their milk was mixed with other milk, and all this, or most of it, was done in perfect ignorance and without any intention to defraud. Some enlightened cattle-owners had, it was true, tried to eradicate tuberculosis from their estates, but though in the long run they would reap the benefit of their right action, the initial cost had been such that others had not been encouraged to follow their good example.

Much could be done by private enterprise, but, as a matter of simple justice, it seemed to him evident that the first cost of a general fight against tuberculosis must be borne not only by the raiser of stock, the dairy farmer, the cattle dealer, and the dairyman, but also by the consumers for whose protection measures had to be taken. It might be difficult to enforce the necessary regulations throughout the whole kingdom all at once, but it

should be possible, by stringent measures, applied locally, to get rid of all tuberculous cattle and clear all infected places in, say, a county or a combination of counties. This being done, it would then be possible to make any person introducing tuberculous cattle in such a district responsible for such an act. Having studied the question of tuberculous infection for a number of years, he was more and more convinced that tuberculosis must be considered

A SERIOUS PUBLIC DANGER.

In order, however, that the meeting should be able to judge, he had to bring before them evidence from which they would draw their own conclusions as to the nature and extent of the danger. Professor Delépine proceeded to explain the nature of tuberculosis and its effects on the human system. We had not, he said, even the consolation to think that a disease which produced such frightful ravages was rare, for if we consulted statistics it became evident that tuberculosis must be considered a very frequent disease. Even at the present day, when by improvements, in sanitation the disease was less frequent in the lungs than it used to be, it was found that about one-tenth of all deaths were due to pulmonary phthisis alone. Now, thanks to numerous researches which had been made during the last thirty-five years, we knew exactly how the disease was produced. Before that knowledge had been acquired it was impossible to deal with tuberculosis in an efficient way; there was an almost general belief in the heredity of tuberculosis. It was thought that the disease was transmitted from parent to offspring, and the contagious nature of tuberculosis was overlooked by most, and barely believed in by a few. Now, on the contrary, we had absolute proof that the disease was produced by the tubercle bacillus. The bacillus might penetrate the body in various ways, but the two most important channels of entrance were the air and the food passages. In the case of infants, it was impossible to doubt the importance of the latter channel of infection. Judging from statistics, it was evidently far from unfrequent. Children began to be seriously affected with *tabes mesenterica*—a kind of consumption of the bowels and of the glands attached—only after they had reached the age of six months, *i.e.*, after most of them had begun to be fed on cow's milk, or foods other than the maternal milk. In the first three months of life hardly any deaths could be attributed to tuberculosis; in the second year in more than one-fourth of all the children dying evidence of tuberculosis could be found. We were, therefore, bound to admit the importance of infection through the alimentary canal, and the danger would evidently be proportional to the amount of tuberculosis in cattle. With regard to the prevalence of tuberculosis in cattle, by putting together figures collected in England, France, Germany, Denmark, and Holland, and based on the examination of some 600,000 head of cattle, he found that more than 16 per cent. were reported as having been tuberculous. Some important German returns gave 15 per cent. Danish statistics gave 17·6 per cent. Recently in Manchester Mr. King, the Chief Veterinary Inspector, found on inspection of cattle slaughtered in the Manchester abattoir, and taken as they came, that 41 per cent. of the cows were affected with tuberculosis. The incidence was less in younger animals, in bulls, and in bullocks, and very slight in calves, so that taking all together

ABOUT 28 PER CENT. WERE AFFECTED

with tuberculosis. Those statistics showed the greatness of the evil, but did not show its distribution. It was well to remember that in certain cowsheds where tuberculosis had gained a permanent foothold as much as 80, 90, and even 100 per cent. of the cows were in a tuberculous state. It was, however, fortunate that the milk of tuberculous cows did not usually become infectious unless the udder was diseased; and it was still more fortunate that the udder became affected in a small proportion of tuberculous cattle. Yet it must be remembered that it was impossible to tell when the udder of a tuberculous cow was going to become affected. In Manchester it would appear that about six of thirty-six cows in a state of advanced tuberculosis had tuberculosis of the udder. He examined specially the milk of twenty-four tuberculous cows in a state of advanced tuberculosis, and found that in six of these tubercle bacilli were present in such numbers as to cause tuberculosis in guinea pigs. Details of these observations would be found in Dr. Niven's report on cowsheds. He might say further that in three of these cases he himself had an opportunity of examining the udder, in which he found tubercles; in two more the Veterinary Inspector reported the presence of tuberculous lesions; in the sixth case it was not possible to obtain certain information. So that unmixed milk taken from tuberculous cows specially selected from among cows kept in Manchester byres proved to be capable of causing tuberculosis in 25 per cent. of the cows examined, and in nearly all, if not all, these cases the udder was affected by the disease. Evidence of this kind showed that we had to deal with a real danger. It was, however, seldom that the unmixed milk of a tuberculous cow reached the consumer, except in the case of children and invalids, and it might be urged that, after being diluted with good milk, the tuberculous milk ceased to be dangerous. This point had been tested both in Manchester and Liverpool, and as he had assisted the Medical Officers of Health in this work he was able to say what he found. The milk was collected at the railway stations immediately on its reaching town, and examined at once in his laboratory. He found that not less than 6 to 7 per cent. of the specimens examined were capable of producing tuberculosis—sometimes very rapid in its march. This was not the only evidence of danger he found in connection with our milk supplies, but he purposely alluded only to tuberculosis here. Now this infectious milk might be seldom dangerous to adults, but he had no doubt that a very large number of children were

KILLED BY IT EVERY YEAR,

and that adults would be the better for not using it. The danger being admitted, what should he say with regard to the remedy? He could only suggest the directions in which measures would prove efficient. A question of this kind was more in the department of an administrator than of an investigator. (1) The first general measure which could be recommended as being in the hands of the consumer was the boiling of all milk used.

The prejudice against boiled milk was not justified, in his opinion, and he knew families who had not, on his advice, used anything but boiled milk (except with their tea) for the last fourteen years, and had never suffered from the absence of unboiled milk. He knew children, now nine and thirteen years of age, who had never within his knowledge taken any unboiled cow's milk. and had never shown any dislike for boiled milk. The great objection to this remedy was that it did not check the spread of tuberculosis in cattle; it did not protect our cream, butter, and cheese supplies. (2) A second method of dealing with the question was to analyse from time to time samples of milk taken on the market, and condemn unmercifully any milk with dangerous properties. This method was not a practical one. It did not protect the public, for a good reason. It was not easy to detect, by rapid methods, whether a sample of milk was tuberculous or not; and while an examination was being made one hundred people might partake of very dangerous milk. It was actually impossible to examine all the milk reaching a town daily, and there must remain intervals during which the public was not protected. This method was really an investigation method, which had a great use in testing other methods of prevention to see whether they were really effective, but which could not be used as a routine preventive method. (3) We must turn to the actual source of milk—to the cow—and see that it was not allowed to contaminate our milk supply. This meant systematic inspection of cowsheds by competent veterinary surgeons; the use of the tuberculin test, in conjunction with careful inspection of each cow; the separation of tuberculous cows from healthy cows; the fattening of cows in a moderate state of tuberculosis for slaughter; the separation of milk from tuberculous cows, and

ITS STERILISATION BEFORE USE,

the throwing away of all milk from tuberculous udders; the thorough sterilisation of infected sheds before they were used again; the better construction of cowsheds, to make cleaning, lighting, and ventilation more perfect, without going beyond what was absolutely necessary. (4) All these measures would have but a temporary effect if no care were taken to prevent the introduction of tuberculous cattle from neighbouring or foreign parts into the county, for he would for the present imagine that they were dealing with the matter as if it were a county question. All cattle brought into the county should be seen and tested by veterinary surgeons appointed by and acting under the direction of some central County Authority. All cattle should be marked and registered, so as to make it possible to detect at once the introduction of cattle, and also to record the tests to which each animal had been submitted. All cattle should be inspected and tested about twice a year, and tuberculous animals weeded out. The breeding of healthy cattle should be encouraged, and provision should be made to keep calves well protected against any chance of infection. (5) Tuberculous persons or animals should be excluded from all dairy farms or dairies. Milk pails, cans, &c, should be kept scrupulously clean, as well as anything coming in contact with the milk. Of the methods he had mentioned two seemed to be of such a nature that they must be controlled by central Authorities—(1) the systematic and periodical inspection of cattle; (2) the testing of all new cattle introduced into a county. The third method was in the hands of the consumer—*i.e.*, the boiling of milk. If such methods were adopted, it would then be only right to see that whilst our home milk supply was properly supervised, foreign dairy produce was not allowed to flood our market unless good guarantees were obtained that proper measures had been taken to safeguard the consumer.

MEDICAL OFFICERS AND THE INSPECTION OF MEAT.

IMPORTANT LOCAL GOVERNMENT BOARD DECISION.

The Burnley Rural District Council has recently had cause to appeal to the Local Government Board to decide upon the refusal of their Medical Officer of Health, Dr. Dean, to examine a suspected carcase, at the request of the Sanitary Inspector, unless he was paid a fee for so doing. The Sanitary Inspector, Mr. S. Edmondson, tells the story thus:—

"On the 7th inst. a farmer called to say that he had been obliged to kill a cow, and he wished the same inspected, in order that he might dispose of it. Knowing that Dr. Dean had refused to accompany Mr. Halstead, one of our Inspectors, in a previous case, unless he was paid for so doing, I accompanied Mr. Halstead to inspect the carcase in question, which was deposited at a farm in Briercliffe. I found the carcase well and carefully dressed, and hanging in the barn. The condition of the carcase was fairly good, but on examination of the lungs I found evidence of tuberculosis. I thereupon pronounced the flesh as unfit for human food. The farmer being dissatisfied, I offered to take the opinion of the Medical Officer of Health. On informing the Medical Officer he asked if I had seized the carcase. I replied that I had not actually said I would seize this carcase, but I had said it was unfit for human food, and on the farmer's expression of dissatisfaction said I would ask you (Dr. Dean) to inspect it. Dr. Dean replied, 'As you have not seized it, it is not the property of the Council, and I shall want two guineas if I go to examine it. I am not a meat Inspector.' It was then arranged that Mr. Halstead should go to the farm and formally seize the carcase, and if the farmer objected to its destruction it should be brought away and notice given that application would be made to a Justice of the Peace on the following morning for an order to destroy the carcase. The farmer, however, consented to the destruction of the carcase before incurring any further risk."

Subsequently Dr. Dean appeared before the Council, and stated that he was not bound to examine the carcase unless he was paid a fee for so doing, and the Clerk to the Council was directed to inquire whether under Article 18, Section 8, of the Duties of Medical Officers of Health, he was not

bound to inspect and examine the carcase in question without the payment of a fee.

The reply from the Local Government Board was as follows:—

"March 3rd, 1898.

"Sir,—I am directed by the Local Government Board to acknowledge the receipt of your letter of the 9th ultimo, with reference to the refusal of Dr. Dean, the Medical Officer of Health of the Burnley Rural District Council, to examine the carcase of an animal unless he was paid a fee for so doing.

"In reply to your inquiry as to the duty of the Medical Officer of Health in the matter, I am to state that under Article 18 (8) of the Board's General Order of 23rd March, 1891, the Medical Officer of Health is required 'in any case in which it may appear to him to be necessary or advisable, or in which he shall be so directed by the Sanitary Authority, to inspect and examine any . . . carcase . . . exposed for sale or deposited for the purpose of sale or of preparation for sale, and intended for the food of man, which is deemed to be diseased, or unsound, or unwholesome, or unfit for the food of man.'

"It appears from the statement which accompanied your letter that the carcase in question was deposited at a farm, that it had been 'dressed,' and if found satisfactory was intended for human consumption. The Inspector, however, in examination of the lungs, considered that there was evidence of tuberculosis, and he therefore pronounced the flesh to be unfit for human food.

"The owner of the carcase being dissatisfied with this opinion, the Inspector offered to take the opinion of the Medical Officer of Health. The duty of the Inspector on this subject is indicated in Article 19 (7) of the Order referred to. By that article, in case any carcase appears to him 'to be intended for the food of man, and to be unfit for such food, he shall cause the same to be seized, and take such other proceedings as may be necessary in order to have the same dealt with by a Justice; provided that in any case of doubt arising under this clause he shall report the matter to the Medical Officer of Health, with the view of obtaining his advice thereon.'

"The Inspector was therefore acting in accordance with his duty in referring the case to the Medical Officer of Health, and it appears to the Board that it became the duty of the Medical Officer of Health to take such steps as might be necessary to enable him to advise the Inspector on the subject.

"The Board consider that article 18 (8) of their Order does not justify the Medical Officer of Health in arbitrarily refusing to inspect and examine a carcase, but that the option given to him by the article must be exercised after considering all the circumstances of the case.

"On the facts now before the Board, they are disposed to think that there were sufficient grounds for making an inspection and examination, and they are of opinion that the Medical Officer of Health should not have refused to make it.—I am, sir, your obedient servant, A. D. Adrian, Assistant Secretary."

THE DANGERS OF DRUGGED BEER.

Pure beer is verily a case of life and death. Chemically treated and concocted stuff sold as beer is found to produce a species of degeneration of all the organisms, profound and perceptive. Fatty deposits, diminished circulation, conditions of congestion, perversion of functional activities, local inflammation of both the liver and the kidneys, are constantly present. Intellectually a stupor amounting almost to paralysis arrests the reason, changing all the higher faculties into mere animalism, sensual, selfish, sluggish, varied only with paroxysms of anger that are senseless and brutal.

In appearance the drinker of impure beer may be the picture of health, but in reality he is most incapable of resisting disease. A slight injury, a severe cold, or shock to the body or mind will commonly provoke acute diseases, ending fatally.

Compared even with inebriates who use the worst kind of alcohol, he is more incurable, more generally diseased.

The constant use of this chemical-laden beer every day gives the system no recuperation, but steadily lowers the vital forces. It is the direct result of observation that drinking of this adulterated beer in this country produces the very lowest form of inebriety, closely allied to criminal insanity, and it is because of this knowledge that legislation against those beer brewers who are guilty of turning out this poison stuff is a matter of moment.

THE EVILS OF OVER-EATING.

By Dr. Dio Lewis.

Large eaters are generally deficient in activity and endurance. I used to know one who tried hard to be a Christian, but failed because of too much dinner. That man was a curiosity. He worked in a small wood turning shop, and ate five times a day. When he consulted me about his "poor stomach" I told him flatly that he was a pig. He replied, "You are mistaken, I am faint half the time, and have to eat extra meals to keep up my strength." I went at him with fact and physiology. At length he was convinced, and promised me that he would follow my prescription, which was this: Take but two meals a day. . . . In fifteen days his faintness had disappeared and he rapidly recovered. To-day he is a healthy, active man and a warm advocate of two meals a day, and moderate ones.

Temperate people with good digestion never feel their stomachs—forget they have stomachs—while these big eaters are always hungry, faint, or bloated, troubled with eructations, acidity, diarrhœa, or some other unhappy condition of the digestive apparatus.

Persons having a good stomach to begin with can by practice learn to digest an enormous quantity of food. If they give their whole force and vitality to this business of grinding grist, they can, in the course of even a short life, grind through immense quantities. But the wiser, the more human way, is to find out just how much food is needed to run the machine, exactly what fuel will keep the system at the best working point, and never pass these bounds.

For years the author had eaten three hearty meals a day. At length, upon a careful considera-

tion of the physiology of digestion, he thought he was probably using too much of his force in that function. He reduced to two meals a day. He cannot express what freedom of mental and bodily activity he experienced. Men with large heads and well-made bodies sometimes consume so much of their nerve force in digestion that they have nothing left with which to achieve those triumphs that otherwise would be easy to them—*Journal of Hygiene.*

WATERED MILK.

By Joseph H. Geisler, Ph.C., F.C.S.

It is not the purpose of this article to find fault with the cow or with the "town pump" in watering milk, but to explain briefly how the percentage of added water is ascertained, inasmuch as juries, lawyers and judges so frequently find great difficulty in comprehending the data of milk analyses.

Milk analyses commonly state the percentage of water, total solids, fat and the ash. The total solids are the residue left after evaporating all the water, and consist of the fat, caseine, albumen, milk, sugar and ash. The latter is also frequently termed "salts"—saline or mineral matter.

The present New York State law demands that milk shall not contain more than 88 per cent. of water, nor less than 12 per cent. of solids, nor less than 3 per cent. of fat. If the analysis shows the milk to contain more than 88 per cent. of water, or less than 12 per cent. of solids, or less than 3 per cent. of fat, the law deems such milk adulterated. Bearing this in mind, let us take for illustration the results of an analysis of milk which showed:

		Per cent.
Water		89·50
Fat	3·00	
Caseine and albumen	6·88	
Ash	·62	
Total solids		10·50
		10·000

The ash is frequently not estimated. For analysts to calculate the milk as watered in such cases is an unwarranted and questionable licence. In the absence of evidence to show that the above milk has been skimmed, the data would indicate that the milk had been watered at least 14·2 per cent.

Since the law admits the possibility of 88 per cent. of water in pure milk, and the analysis disclosed the presence of a total of only 89·50 per cent. of water, it generally puzzles the uninitiated how it is possible to state that the milk had been watered 14·2 per cent., as the excess over the limit set by law is only 1·5 per cent. Whence the extra 12 7 per cent. ?

The simple rule for calculating the adulteration takes for its basis the minimum limit of solids adopted by law, namely, 12·00 per cent., and may be briefly stated as:

$$\frac{100\ (A-B)}{B} = X$$

in which A represents the percentage of solids in pure milk as defined by law; B the solids found by analysis; X the percentage of water added to the original milk. It must be evident that the addition of water dilutes the total solids and thereby lessens the percentage of the same. To make this clear and at the same time make the above rule more comprehensible, I will present the following practical illustration:

Leaving out of consideration the slight difference in specific gravity between water and milk, let us take 100 lb. of milk of minimum quality (namely, 88 per cent. water and 12 per cent. solids) as the basis for adulteration, and add to it an *equal volume* of water, say 100 lb. It is evident that the milk has been adulterated 100 per cent. The original milk having the composition 88 per cent. of water and 12 per cent. solids contained: 88 lb. of water and twelve lb. of solids.

A chemist analysing the adulterated milk (*i.e.*, after the addition of the 100 lb. of water to the original milk) would find and report the mixture to contain—

	Per cent.
Water	94
Solids	6
	100

with the statement that the original milk had been adulterated by the addition of 100 per cent. of water. The reason for this is apparent. The 100 lb. of original milk contained 88 lb. of water and 12 lb. of solids, to which were added 100 lb. of water, making a total of 200 lb. of mixed or adulterated milk. The mixture therefore consists of 188 lb. of water and 12 lb. of solids. In other words, the solids have been diffused through 200 lb. of mixture. This, reduced to simple percentages (or parts per hundred), necessarily makes the following exhibit:

	lb.		Per cent.
Water in original milk ...	88	= 44 lb. water	
Water added	100	= 50 lb. water	... = 94
Solids in original milk ...	12	= 6 lb. solids	... = 6
Total mixture... ...	200	= 100 lb.	100

Div. by 2

Consequently, the 94 per cent. of water as stated in the analysis, showing an excess of 6 per cent. over the maximum amount allowed by law, viz., 88 per cent., does not indicate a mere excess of 6 per cent. of water, but an actual addition of 100 per cent. of water to the original milk. Sight is lost of the fact that in the adulterated sample the "88 per cent." is not exclusively water of the original milk, but in part some of the added water as clearly shown above.

Addition of water, as above stated, simply dilutes the solids and distributes them through the mixture. The larger the addition of water the greater the dilution of solids, so that the addition of water and loss or diminution of percentage of solids bear a definite ratio to each other. For this reason the solids are taken as a basis of the calculation for estimating the percentage of added water.

Referring to the first analysis above and making the necessary substitutions in the formula—

$$\frac{100\ (A-B)}{B}, \text{ we have: } \frac{100\ (12-10{\cdot}5}{10{\cdot}5}$$

$$= \frac{100 \times 1{\cdot}5}{10{\cdot}5} = 14{\cdot}2 \text{ per cent.}$$

Hence the excess of 1·5 per cent. of water (89·5—88·0=1·5 per cent.) represents an actual adulteration of 14·2 per cent.

Although the calculation is simple, it is nevertheless a fact that the interpretation of the data of

milk analysis is wofully misunderstood. Chemists frequently err in calculating milk deficient in solids as having been watered. As a matter of fact, in the absence of the percentage of ash, chemists are not warranted in their calculation of a percentage of adulteration by the addition of water, for the result may have been brought about by the removal of cream or skimming. However, that is a matter not under consideration in this article, the explanation in which I desire to confine to purely watered milk.—*American Grocer.*

ANTISEPTICS IN THE PRESERVATION OF MEAT.

M. Duprez has recently presented a report to the Board of Health of the Seine, Paris, in which he calls attention to the increasing use of antiseptics by butchers for preserving meat. The product most generally used is olobar, which is nothing but a solution of bisulphate of calcium, containing 99 grammes of sulphurous acid to the litre. Riche claims that the use of this compound is daily increasing, and it is now extensively used in beer. It is claimed by the manufacturer of olobar that its use is harmless in that it does not cause the meat to undergo any appreciable change. This, however, hardly seems probable when we consider that we submit our staple food stuffs to the influence of agents as active as sulphurous acid and the sulphites; neither does it seem tenable that their action would be limited to the initial products of fermentation so as to absorb them and counteract their efforts. Experiments have demonstrated that a 1 to 8 solution of calcium bisulphite will penetrate very deeply the meat soaked in it, and that the normal structure and muscular fibre does not remain the same, hence the refrigerating process alone should be relied upon for the preservation of meats.

DIET OF PROSPECTIVE MOTHERS.

This subject of diet is very often brought to the attention of the physician. Without doubt, some of the discomforts of pregnancy and child-bearing are greatly aggravated by improper diet. The following suggestions are translated from a French journal:—

An excess of water and albuminous food should be avoided—water, on account of its tendency to produce hydroamnion, and albumen, because it favours excessive growth of the child.

The following is the diet prescribed, which has been tried in a number of cases:—

Meat once a day, green vegetables and potatoes, avoid eggs, peas, and beans, as they are too rich in albumen. The advantages claimed for this regimen are:—

(1) The patients are active until the eve of their accouchement; they do not suffer from a sensation of fulness, excessive formation of fat, thirst, or constipation.

(2) Rapid and easy delivery, even in those cases in which the previous labours have been prolonged and difficult.

(3) There is never an excess of liquor amnii.

(4) All the women thus dieted have nursed their babies. The quality and quantity of the milk were always good. The children were very small, but healthy and well formed. They averaged about 6 lb. in weight.

DIET FOR CONSUMPTIVES.

Next to fresh air, diet plays the most important part in the prevention and cure of consumption. It should be highly nutritious and very digestible.

All stimulants should be avoided unless specially ordered by the attending physician, and then only in the exact quantities and at the times specified by him.

THE QUANTITY OF FOOD

is important. Consumption is a wasting disease, and the waste must be more than repaired to get improvement. The patient *must* take, every twenty-four hours, at least two quarts of milk, three eggs, three-quarters of a pound of beef or mutton, and twelve ounces of bread made from the entire wheat. This daily quantity of these foods should be taken as long as they do not produce distaste or disturbances of the stomach or bowels, in which event the suggestions for deviation should come from the physician. In addition to the above, which the patient *must* take, he *may* select whatever suits his fancy from the following:

ARTICLES OF DIET PERMITTED.

Soups. — Oyster, turtle, tomato, mutton or chicken broth. Particularly the jelly and gravy made from meat.

Fish.—All kinds of *fresh* fish and oysters, either broiled, boiled, stewed or baked.

Meats, Bread, &c.—Broiled or roasted mutton or beef, *rare;* steaks; chops, poultry game, sweetbreads, brain, stewed tripe, gelatine, cream cheese, whole wheat bread

Eggs.—Raw, poached or boiled. Raw, beaten in milk.

Vegetables.—Celery, cauliflower, watercress, greens, peas, spinach, beans, tomatoes.

Fruits and Nuts.—Bananas, pears, peaches, plums, apricots, grapes, nectarines, oranges, figs, dates, baked apples—*all without sugar.* English walnuts, almonds, filberts, roasted or boiled chestnuts.

Drinks.—Water, hot water, carbonated waters, milk, boiled milk with or without vichy; cream, koumiss, peptonized milk, cocoa or tea, *without sugar.*

ARTICLES TO BE AVOIDED.

All fried food, veal, pork, sugar, pies, pastry, puddings, salt or smoked meat or fish, macaroni, spraghetti, potatoes, turnips, carrots, parsnips, beets, arrowroot, sago, corn starch, tapioca, hominy, rice, wheat bread, rye bread, iced drinks, ice cream.

If an article of diet cannot be found in either of the above lists, the patient should not decide upon its classification, but should ask his physician to do so.

The following rules should also be observed:—Eat slowly and chew the food thoroughly. Do not take liquids during or shortly after meals. Milk should be taken in sips, and at least ten minutes occupied in drinking a tumblerful. In cases of faulty digestion, take food at regular intervals, frequently, and in small quantities.

HARMFUL EFFECTS OF TEA DRINKING.

Dr. James Wood, an American physician, has published a report on observations regarding the bad effects of tea-drinking. He states that out of 1000 patients applying for treatment at the Brooklyn Central Dispensary, 100 exhibited symptoms pertaining directly to tea-drunkenness, while many others were doubtless suffering more or less from it. The effects of tea, according to Dr. Wood, differ somewhat according to the kind taken, as he finds that the tea of India contains two and one-half times as much tannin as that of China. The headache so frequently suffered by tea tasters, he attributes to the essential oil, of which the tea contains three-fourths of one per cent. Tea tasters drink the infusion immediately after it is made. Dr. Wood notices a great difference in susceptibility to tea-poisoning. He says, "Some people are profoundly intoxicated by indulging in two cups of strong tea per day. . . . We find that an ounce of tea-leaves used daily will soon produce poisonous symptoms. This amount will contain six grains of theine." Of the one hundred cases of tea-poisoning mentioned by the author, sixty-nine were women, and thirty-one were men. Fifty-four drank two pints or less; thirty-seven, four pints or less; and nine, ten pints or less. The following symptoms were present in nearly all cases of tea intoxication: Hallucinations, nightmares, successive dreams, obstinate neuralgia, anxiety, a persistent sinking sensation in the epigastrium, prostration and general weakness, excitement, and mental depression. According to Dr. Wood, tea-poisoning is responsible for half of the headaches, and a large proportion of all cases of despondency, palpitation of the heart, giddiness and allied symptoms. The essential oil of tea which gives out its peculiar aroma, is, according to Dr. Wood, a powerful poison. Its injurious effects are so well recognised by the natives of China that they do not use tea until it is a year old, thus allowing this deleterious substance to escape. Green tea contains more of the essential oil than black tea, which accounts for the fact that it is more productive of nervousness.

THE DIET OF DYSPEPTICS.

How shall we treat dyspeptics? Medicaments are not of much value, or play only a subordinate part. The main factor lies in proper nourishment. These patients, who have abstained from most kinds of food for years, must now learn anew to eat. Their stomach and intestines very quickly adapt themselves to this new condition. First and above all, it is of importance to increase the quantity of nourishment; secondly, to provide a sufficient variety of foods.

In order to improve nutrition, two articles of food, which hitherto have been often avoided by laymen as well as physicians, play an important part, to wit, bread and butter. Bread forms one-third of the total amount of ingested food in health, and besides having nutritive value, serves the purpose of increasing the flow of saliva during its mastication. It also creates an appetite for other food.

Butter not only improves the taste of various kinds of foods, but is also in itself a nutriment of the greatest importance. The great number of calories which butter contains (100 grammes give 837 heat units, while the same amount of bread developes about 217) shows this in the clearest manner. Another advantage which butter presents is that its volume is only about one-third that of bread. A patient taking about one-quarter of a pound of butter a day receives therewith more than one-half of the heat units required. This quantity of butter is well borne by most of the patients.

As nutrition plays the principal part in the treatment of these patients, it will not be amiss to give a few hints with regard to its management. To begin with, it does not appear advisable to permit patients who have abstained for a long while from the coarser varieties of food everything at once. This abrupt change may at times be the cause of various unpleasant symptoms; therefore it should be accomplished gradually. At first give, besides milk, gruels and thickened soups, eggs beaten up in milk, &c. A few days later begin to add to this bill of fare biscuits with butter; then permit meat, the white of chicken, and well-done beef; next, mashed potatoes; still later give wheaten bread, baked or boiled potatoes, soft-boiled eggs, oysters; at last allow vegetables and fruits.

An essential point with regard to nutrition is punctuality in the taking of meals. In most of these cases, in which a gain in weight is of great importance, frequent meals (five or six daily) will be advisable. Although it does not appear advantageous to prescribe for the patient the quantities of the various foods in exact weight (grammes or ounces)—as by so doing they are too easily reminded of their ability or inability to digest this or that quantity and not more—it is nevertheless of value to mention approximate figures by which they may be guided or below which they shall not go.

Thus, for example, they may be told to eat as much as their neighbours at table, or that they shall take ten ounces of milk at this or that meal; or, as I frequently advise, that they shall consume one-quarter of a pound of butter a day. Emphasise those points which appear to be the most important, and leave the patient great liberty in all other particulars. We must strive to familiarise the patient with the idea that ample nourishment will strengthen his organs (including the stomach and intestines), and we must always endeavour to dispel the fear of food with which he is harassed.

Dangerous Cigarettes.—Cigarettes with gilt or silvered ends have become of late fashionable. It is reported that some of these which have been examined have been "gilded" with an imitation of gold attached to the paper by lead chromate; and the silver of others is of a like quality, attached by white lead. As the ends which are ornamented are intended to be placed between the lips, such cigarettes are of course highly dangerous to health.

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Food and Health

SUPPLEMENT TO

THE SANITARY RECORD.

No. 17. JUNE, 1898.

FOODSTUFFS UNDER SCRUTINY.

WHAT TO EAT AND DRINK, AND WHAT TO AVOID.

"SANITARY RECORD" ANALYSES.

IMPORTANT ANNOUNCEMENT.

OWING to the growing popularity of this feature of our "Food and Health" Supplement, we have found it necessary to make arrangements whereby, in future, much fuller reports will be given of proprietary articles than have appeared hitherto. It has been our custom to solicit samples of articles for investigation from the manufacturers direct, unconditionally; but in future such samples as we receive from the proprietors thereof will require to be accompanied by a declaration that the sample is selected from stock, and not put up for the special purpose of analysis. Failing this we shall make the purchases ourselves, selecting the articles at random from the various retail establishments where they are sold.

We have retained the services of Mr. C. G. Moor, M.A., to examine and report on the various substances submitted to us.

All such analyses may of course be quoted as having appeared in THE SANITARY RECORD, but the date must be given, and Mr. Moor's name must not be quoted for advertising purposes without special permission.

Edwards' Humanised Condensed Milk.

Prepared by HENRY EDWARDS, The Creamery, Tutbury.

THIS preparation is designed to provide a condensed milk at a price within the reach of all, which shall, when simply diluted with water, produce a liquid having the same chemical composition as human milk. The ordinary sweetened condensed milks are overloaded with sugar, and the unsweetened condensed milks, though more suitable for feeding young children on, contain a proportion of albumenoids to fat which is considerably higher than is the case with human milk.

The sample yielded on analysis the following figures:—

Fat	13·5
Nitrogenous matter...	7·0
Milk sugar...	21·2
Mineral matter...	2·0
Water	56·0

When diluted with three parts of water, according to the directions, it will clearly produce the closest possible imitation of average healthy human milk, and should prove of great value not only to young children but also to invalids.

THE HEALTHFULNESS OF MILK.

To be suspicious of the purity of our supply of milk is to have our peace of mind completely destroyed. Milk is the food for our tender infants, and it enters into the majority of our prepared foods which we estimate mostly as luxuries. We have been much disturbed of late years by the discoveries made in regard to the many and serious risks we run in this respect. Nothing else has so disturbed the public. It has been charged that the very large number of deaths among infants is due to impure milk, and the most deadly of the diseases by which both young and old are affected have been laid at the door of the dairyman. This is a very serious matter, if it is all truth. But while there is unquestionably good reason to be disturbed on this account, we must not be misled by the perhaps too common habit of exaggeration of whatever may be made a source of excitement by some of those writers who delight in making a sensation. The fact is that there is nothing in all that has been said and written of late in this respect that has not been existing for many years. Indeed, those who have the means of knowing these things are very sure that the public health is far better preserved now than it has ever been before, and that the death-rate is steadily decreasing. But while this is so it gives no good reason why we should not still further improve in this respect, and taking all that is said and written on the subject seriously to heart, make every attempt to conform in our dairy practice to all the modern improvements in regard to sanitary conditions.

The recent discoveries in regard to the behaviour of the uncountable numbers of injurious organisms which are to be found in all decomposing matters have given us altogether new ideas in regard to the importance of the most thorough cleanliness in the work of the dairy. But it is no small thing to contemplate. It covers everything. There is

nothing, however small it may appear to us, which is not mixed up more or less in this study of what it is to be clean in our dairy work. One may think that it is sufficient to avoid the dropping of the filth from cows into the pail by carefully brushing them before the milk is drawn. But this is only a small part of it. The source of impurity may be in the cow, derived from her food, or the water she drinks. It may be in the air she breathes, or in her condition of health disturbed by some inconspicuous accident in her management. It may lurk in some corner of some utensil, or in the water in which these have been washed. It may even be in the person who is milking the cows, existing in his clothing and brought unknowingly from some quite unthought-of source. Indeed, we believe that the large majority of cases of sickness or deaths due to infection of the milk by germs of disease are thus originated. So that it is a very deep and broad subject to study, and a matter for more than a casual thought, how milk may be preserved in the strictest purity, and its healthfulness certainly assured.

It is quite certain, however, that the chief and most frequent source of infection of milk with unwholesome germs is the water in which the utensils are washed. We are not to think, however, that infection of milk is anything like nearly so frequent as is sometimes alleged. It is, we believe from a constant watch upon the matter in every possible direction, a rare thing to happen, but when it does occur the consequences are exceedingly disastrous. Instances have happened in which fifty, and even more than a hundred deaths, have been clearly traced to the infection of milk with the germs of typhoid fever through the water used in the way mentioned. And we all know how it is at this season, when the accumulation of waste matter on the ground through the winter is very apt to be washed into springs and streams by the melting snow, or the overflowing of the surface by the spring rains. So, too, we may easily suspect a great number of wells in which surface drainage may flow and carry with it the accumulated filth gathered during the winter. Doubtless much of the sickness that comes with the spring and early summer may be thus caused, and it should be seriously thought of by all concerned.

Water is a general solvent, and this fact is not thought of as it should be. We think much more of impure air, but this is not nearly so serious a matter as impure water. Water is absorbed directly into the blood, and all its impurities, of course, thus go to the very fountain of life. Water is not filtered of its impurities as the air is. When air is breathed it passes through the nostrils which are almost moist and covered with an adhesive mucus, by which in many cases the injurious germs are arrested, and discharged with the infected matter. So that impure air is quite innocent in comparison with impure water, and whether this goes into the cow or infects the dairy utensils, it has the same result, the infection of the milk.

Impure air is the next in importance of the various dangers to milk. This is absorbed by the cow and infests the blood, and, of course, the milk. It is filled with noxious germs which settle on the milk as it is drawn into the pail, and as the milk may stand in a filthy stable. A case is reported in which cheese made from milk infected by the odours from a dead animal in a field at some distance from the cow stable was quite unfit for use, and if such was the result it would have been much worse for the butter made from such infected milk. Dust from mouldy hay has been shown by experiment to spoil milk for butter making; at times wholly preventing the churning by the foaming and slimy condition of the cream. The same impurity has been detected as the cause of floating curds in the cheese vat, and it is by no means an uncommon occurrence. Mouldy litter under the cows has had the same result by the action of the special germ of the mould on the milk. In short, every kind of impurity that may be existing in the cow, or its surroundings, may be traced all through the milk and its products, and its behaviour in making these, as clearly as one's footsteps may be traced in the winter's snow.

POISONED SHELL FISH.

Mr. E. B. Reece, coroner, held an inquest at the Town Hall, Cardiff, on the 7th inst., on the body of a child named Beatrice Maud Hicks, the seven-year-old daughter of George J. Hicks, an engineman, living at 35, Llantrisant-street, Cathays, Cardiff, who died under painful and mysterious circumstances on the morning of the 4th inst. It appears that the inquest was held at the instance of Dr. Sheppard in consequence of the death of Beatrice's little sister, who died on Wednesday morning earlier in the same week. The doctor had certified the death of the first child, as, although no cause could be found to account for the fatal issue of her illness, the case seemed simple, and it was only upon the death of the second child, under similar circumstances, that it was deemed necessary to hold an inquiry. The story told by the father, George Hicks, was that on Whit-Monday the two children were playing in a field off Llantrisant-street, when they picked up and ate some periwinkles, which were in a decayed state. They were seen to do this by another little girl, named Joyce. She, being a little older than the other children, told them not to eat them as they were stinking badly, but, unfortunately, they had swallowed a good many. In the evening the children returned home and went to bed. On Tuesday morning Sarah Ann seemed very ill, and her sister Beatrice, who slept with her, said that during the night she had been restless, and seemed very unwell, and had been vomiting. The father immediately went for Dr. Sheppard, who on arriving found that the child was both feverish and delirious, and suffering from acute peritonitis. He saw the child several times, and she grew gradually worse and worse, and died at 1.30 on Wednesday morning. The doctor certified the death as being due to peritonitis. The funeral was fixed for Friday, when the second child, Beatrice, on whom the inquest was now held, became very ill. Dr. Sheppard was again called, and he found the second child suffering in every way the same as the first had, except that she was not delirious. She died on Saturday morning. The doctor was stating his intention to have an inquest held, and debating with the father as to whether or not a *post-mortem* should take place, when the mother sent for them, saying that she had heard from Joyce about the children eating periwinkles.

The mother then went into the box, and in every way corroborated the father's tale, adding, however, that rumour seemed to point to the fact that a man had been seen selling periwinkles in a field near, and that, as he had not been able to get rid of them all, he had thrown some away.

The little girl Joyce then described seeing the two deceased children eating the periwinkles, and telling them to throw them away. She, too, had heard of a man being seen selling periwinkles in the neighbourhood.

Dr. Sheppard corroborated the story of the father as to being called to the child, Sarah Ann Laura, on Tuesday morning. She was undoubtedly suffering from acute peritonitis, or inflammation of the intestines, and he saw from the first that the case was hopeless. He was much surprised when called in to the second child, Beatrice. He saw no hope of her recovery either. In both children the symptoms were most marked, and he considered the circumstances pointed towards poison. When he heard about the periwinkles he had not the slightest doubt that they were the cause of the trouble, and that the children died from ptomaine poisoning. He had not made a *post-mortem*. Decayed periwinkles would certainly bring about such an illness.

The Coroner, in summing up, said the case was most painful and serious. If a man had been really selling decayed periwinkles and had thrown them away he could, doubtless, be prosecuted. The police had made a number of inquiries, but had failed to get at anything definite.

The jury, without hesitation, returned a verdict in accordance with the medical evidence—that the children died from ptomaine poisoning, consequent upon eating decayed periwinkles.

MEAT INSPECTION ON THE CONTINENT.

It is well known that sanitary legislation, especially in regard to foodstuffs, is more advanced in continental countries than it is here.

In Belgium, one of the nearest and most enlightened, a complete system of meat inspection was instituted in 1890. One of the regulations states: "The Government is authorised to regulate and supervise the trade in foodstuffs, and substances for the food of man and animals, but only from the point of view of public health, or with the object of preventing imposture and adulteration.

"It can further, but only in interests of public health—. . . As regards butcher's meat especially, it must not be exposed for sale or sold unless it has been recognised as fit for food after an expert examination. If fresh meat is in question, this expert examination must take account of the condition of the internal organs."

Regulations are also made, and definite instructions given, regarding the inspection of meat imported from abroad.

Most of the continental countries proceed on somewhat similar lines with different variations, and surely we ought not to be behind in protecting the public so far as possible from being imposed on with unwholesome or diseased meat. In Prussia the regulation states: "All animals must be examined before and after slaughter by a veterinary surgeon, or by an Inspector. The latter, however, can only pass judgment in certain definite conditions (which are elsewhere specified), and must call in a veterinary surgeon whenever there is the least doubt." "No animal may be slaughtered or cut up without the approval of the Inspector, and only such parts of the carcase may be used for food as are passed by him. In the case of fresh meat introduced from without, a certificate must accompany it, showing that it has been inspected by an expert." And in Norway—"In every commune where the above laws are in force, all fresh meat exposed for sale for human consumption must be examined by the Municipal Inspector and stamped." The laws referred to are in connection with the establishment of public slaughter-houses.

ADULTERATION OF MILK.

IMPORTANT DECISIONS.

The Farmer Co-operative Association, Limited, of Plough-yard, Shoreditch, was summoned by the Sanitary Authority of St. Leonard, Shoreditch, for supplying to the Holborn Union Workhouse, City-road, milk not of the nature and quality demanded.

Mr. Robinson, Vestry Clerk, supported the summons, Mr. W. T. Ricketts, solicitor, defending.

The case for the prosecution was that the milk supplied under contract to the workhouse not being satisfactory, samples were taken from the four churns, thirty-four gallons, delivered on the morning of the 13th ult., and in three cases the contents found to be adulterated with water.

Mr. Ricketts, for the defence, put in four contracts from farmers supplying the particular milk, and these contracts being read, showed that the company contracted at 1s. per gallon for milk, "pure and with all its cream, not less than 10 per cent." He submitted that these contracts under the decision of "The Farmers and Cleveland Dairy Company *v.* Stevenson" exonerated the defendants, and called evidence to prove that the milk was not tampered with, but was sold as received at Liverpool-street Station.

Mr. Corser dismissed the summons against the company, and said he would grant summonses against the farmers, if the Vestry Clerk had satisfied himself who was responsible.

THE PURE BEER QUESTION.

BARLEY-MALT SUBSTITUTES.

The best of all beers is brewed in Bavaria. It is there made an illegal act to brew from anything but barley-malt and hops. The beer is so pure and palatable that the Bavarians drink every gallon that is brewed, although the quantity is something very considerable. A great quantity of beer is both brewed and consumed in Great Britain; but, inasmuch as British brewers are permitted "to use any wholesome materials" for the purpose of their trade, it follows, perhaps naturally, that numbers of them prefer to brew from those materials which come cheapest. Those who have

followed the labours of the Beer Materials Committee have been able to form some sort of idea of the extent to which these cheaper substitutes are employed.

POTATO-GLUCOSE, MAIZE, INVERT SUGAR, AND RICE

are used in enormous quantities. It cannot, perhaps, be alleged that any one of these articles is other than "wholesome." There is no reason why brewers should not employ any or all of them in the manufacture of beer. But there is abundant reason for urging that every brewer should be compelled to declare the nature of the beer he brews and sells. Mr. Charles E. Cassal, F.I.C., secretary of the Society of Public Analysts, in his evidence before the Committee, expressed the opinion that brewers who use these cheaper substitutes for barley-malt directly contravene the principles of the Food and Drugs Act, and should therefore be compelled to declare the nature of the liquor they brew. He said of beer, concocted of potato-glucose, invert sugar, maize, rice, or other materials than barley-malt and hops, cannot be of "the nature, substance, and quality" of beer, any more than an admixture of margarine and butter can be held to be of "the nature, substance, and quality" of butter. The one is as much a case of adulteration as the other, he maintains. "Beer" is a term which, by long usage, has become associated with a drink brewed from barley-malt and hops. Parliament has dealt loosely with its legislative enactments in regard to food adulteration.

NO LEGAL DEFINITION OF "BEER."

Any kind of drink may be called and sold as beer, and all kinds of slop are palmed off upon the unwary under that generic term. There are British firms claiming to brew only from barley and hops; but even some of these have been discovered in the act of brewing from cheap foreign barley where they represented themselves as brewing from British barley. The term "beer" needs to be more strictly defined. The most convenient course would be to make it stand for a liquor brewed only from barley-malt and hops. The average man who purchases beer expects to be supplied with a liquor so composed. Oftener than not he pays for an article which is not what he expects it to be. It may be potato squash or sugared water merely. The brewer who sells these concoctions as "beer" is morally guilty of fraud. It may be that some of these compounds are as strength-imparting as barley and hop beer. Some people allege that margarine is equal to butter as a food. But the provision dealer who sells margarine as butter is liable to conviction for raud; and

THE LAW OUGHT TO BE SO AMENDED

as to make it illegal to sell cheaply-brewed drinks as beer, when, in the popular sense of the term, they are nothing of the kind. Let it be owned at once that this is not written in the interest of the British barley grower. But does it not also serve the interests of the beer consumer? He pays for his beer the price for which a sound barley and hop beer may be provided; and too often he gets drink which is not worth one-half its cost.

THE DETECTION OF ANNATTO IN MILK.

Milk is often coloured with a trace of annatto to give it a fictitious appearance of richness. To detect this addition, A. Leys employs the following test:—Fifty cubic centimetres of the sample are shaken out with twice the volume of ether-alcoholic mixture composed of alcohol (93 per cent.) 40·8 c.c., ether 54·4 c.c., water 3·4 c.c. Solution of ammonia (sp. gr. 920) 1·4 c.c. After separation, the ethereal layer is rejected, the colouring matter being retained in the aqueous portion. This is transferred to another vessel and half its volume of a 10 per cent. solution of sodium sulphate gradually added, which causes the slow separation of the casein. The clear aqueous portion is decanted and shaken out with amylic alcohol, the washing being conducted in test tubes to facilitate the separation of the solvent. After shaking, these tubes are plunged into a cold water bath, the temperature of which is gradually raised to 80 deg. Cent., when separation will be complete. The amylic alcoholic solution is collected and evaporated. The deep yellow residue is re-dissolved in warm water containing a little ammonia and alcohol, a strip of bleached cotton is immersed in the solution, and the whole evaporated to dryness. The cotton, which is now of a yellow tint, is washed and plunged into a solution of citric acid. If the colouring be annatto, the thread will at once assume a marked rose tint. Uncoloured normal milk imparts a very light yellow tint to cotton by this method, but does not give the change of tint with citric acid, which is characteristic of annatto.—*Journ. Pharm.* (6), vii., 287.

POISONED BY MUSHROOMS.

Dr. George Danford Thomas held an inquest at the St. Pancras Coroner's Court with reference to the death of Arthur Hicks, forty-three, carpet planner, Leighton-road, Kentish Town. The widow stated that on Sunday week her husband cooked and ate some mushrooms, which he had purchased on the previous night at a neighbouring greengrocer's. Soon after eating them he complained of having a very hot taste in his mouth and severe pains in his stomach. Witness, who also ate some, had a hot taste in the throat, but her husband became worse. On the following morning Dr. Fountain was called in to attend to him, but he died on Thursday. Dr. Owen Fountain, Camden-road, stated that he found Hicks suffering from inflammation of the bowels. He afterwards saw, at the greengrocer's shop, a specimen of the mushrooms. They were of the kind known as horse-mushrooms, which, in his opinion were certainly not fit for anyone to eat. He was informed at the shop that they had been brought from Kent. They had a pink colour, but by keeping that would become dark, and be mistaken for the colour of cultivated mushrooms. The effect of eating them would be to cause irritation and inflammation, and ultimately death. The jury returned a verdict of death from misadventure.

When answering Advertisements please mention the Sanitary Record.

THE INSPECTION OF MEATS FOR ANIMAL PARASITES.

A COPIOUSLY-ILLUSTRATED treatise of high practical value has been prepared by the Bureau of Animal Industry of the United States Department of Agriculture, under the direction of Dr. Salmon, Chief of the Bureau. It deals primarily with the parasitic entozoa that infest the bodies of animals —cattle sheep, swine—used for food by man; and, in the second place, it is competent to serve as a guide to stock-breeders and to those who are engaged in the prosecution of sanitary work. The main portion of the volume relates to the flukes and tapeworms of cattle, sheep, and swine, with special reference to the inspection of meats. The more important facts relating to the flukes and tapeworms which Inspectors are likely to find in abattoirs and slaughter-houses are here passed under review. Since certain bladder-worms—such as the beef measle, *Cysticercus bovis*, and the pork measle, *Cysticercus cellulosæ*—are directly transmissible to man through the use of meat, a knowledge of these parasites should enable Inspectors to prevent the spread of the tapeworm stage of these organisms among human beings by condemning the infested meat, or by subjecting it to processes that would render it harmless. The rigid system of meat inspection pursued in Germany has resulted in an actual decrease of tapeworm disease in man and of the frequency of *Cysticercus cellulosæ* in the human eye. Condemnation and destruction of organs infested with certain other parasites—the hydatid *Echinococcus*, the gid bladder-worm, *Cœnurus*, and the long-necked bladder-worm, *Cysticercus tenuicollis*—would prevent the spread of these organisms in their alternating tapeworm stage to dogs, and by that means prevent the re-infection of man and of domesticated animals. In this case prevention of tapeworm disease in dogs, though of comparatively little importance so far as the dogs are concerned, becomes vastly important, not only in public hygiene, but also from an economic point of view in preventing financial losses to stock-raisers from disease and death in their flocks and herds. The destruction of livers heavily infested with fluke would also result indirectly in the diminution of fluke disease in man and live stock. As certain of these animal parasites are capable of bringing about in meat pathological appearances which may at first sight be mistaken for tuberculosis, this furnishes an additional reason for the adequate instruction of Meat Inspectors.

Amongst the general methods for the prevention of parasitic diseases precedence is given to the segregation of slaughter-houses. Every such house is regarded as a centre of infection for the surrounding neighbourhood, not only of diseases caused by animal parasites, but also of such diseases as hog cholera, swine plague, and tuberculosis. By compelling the butchers of a town to do all their slaughtering at one place the risk of spreading disease is minimised. The sanitary supervision of slaughter-houses is next advocated, the work to be entrusted to a competent Veterinary Inspector. In small towns, where the offal is not sufficient in quantity to pay for preparing it as a fertiliser, there would seem to be no valid sanitary objection to feeding the offal of healthy cattle and sheep to swine, but swine offal should never be fed to other pigs until it has first been thoroughly cooked. There should be regular inspection by a qualified veterinarian of all meats before they are allowed to leave the slaughter-house. The rigid exclusion of dogs would prevent the spread of a number of dangerous parasites; rats, again, are active agents in disseminating disease from slaughter-houses. The raising of hogs and other animals at slaughter-houses is a practice which cannot be too severely condemned. The treatment of cattle, sheep, and swine suffering from parasitic worm disease is summed up in two general rules—(1) the treatment for the larval tapeworms and the liver flukes must be preventive, as no known medicinal treatment is satisfactory; (2) the treatment for the adult tapeworms and the intestinal flukes should be medicinal, as this is effective, and the life history of most of these organisms being still problematical, there are no reliable data upon which to base preventive measures.

The disposal of condemned meats is a matter of high practical importance. Destruction by burial or burning is opposed as causing unnecessary loss. The methods favoured are (1) utilisation as fertiliser; (2) rendering the meats harmless by cold storage, cooking, or preserving, and then placing them upon the market; (3) selling the meats under a declaration of their character. As to the first named there is no parasitic disease known which will withstand the temperature used at the large abattoirs in the preparation of fertilisers. With regard to cold storage, experiment shows that such a parasite as *Cysticercus bovis* dies about two or three weeks after the death of its host. Three weeks of cold storage would therefore render a light infection of this kind absolutely harmless, and the meat could safely be placed on the block. In the case of the disease known as pork measles, the parasites live for a month or longer, so that more care would be necessary in dealing with it. Many American abattoirs tank certain meats of inferior quality for the purpose of canning. The heat employed is not so great as that used in tanking for fertilisers, but, as *Cysticercus bovis* cannot survive a temperature of 140 deg. Fah. for five minutes, and as the meats tanked for canning are thoroughly cooked, it is claimed that a light case of beef measles would be rendered perfectly harmless by the cooking preparatory to canning. In the case of trichinosis, again, the parasite cannot withstand a temperature of 158 deg. Fah., so that if trichinous pork is cooked until the whole of it has reached this temperature and acquired a light grey colour, the disease is rendered non-transmissible to man. As regards salting, the parasite of beef measles is killed in twenty-four hours by the action of salt solution, and in no case has the parasite of trichinosis been found to withstand immersion for four months in the pickling vats. In both cases it has to be remembered that some time must elapse before the salt can thoroughly permeate the tissue, and that large pieces of meat require longer immersion than small ones.

Hydatid disease receives special attention in this work, which is undoubtedly the most complete of its kind in the English language, upon the preparation of which, moreover, Dr. C. Wardell Stiles has evidently spared no trouble. Hydatids represent the alternating larval or bladder-worm stage of one of the commonest tapeworms. Up to the present time hydatid disease is comparatively rare

in the United States, and it is hoped that by the exercise of proper precautions at the abattoirs and slaughter-houses the dangerous parasite may be totally eradicated from the country. Unless, however, such steps are speedily taken it is probable that the United States will in time take its place with Iceland, Germany, and Australia in respect to the number of human lives sacrificed to a disease which, so far, has gained little foothold in North America, and can at present be easily controlled. The 124 illustrations, many of them original, are admirable. Among the more striking are those of the liver fluke, the lancet fluke, the human blood fluke, ox-tongue infested with beef measle, the tapeworm of beef measle, pork infested with pork measle, the bladder-worm of pork measle, lamb's liver infested by the marginate tapeworm, sheep's brain infested with gid bladder-worm, and hog's liver infested with *Echinococcus* hydatid.

NUTRITION IN POTATOES.

I. B. Cappoch gives in the *Herald of Health*, his views on the potato. It has the following composition in parts per 100:—

Water	75·77
Albuminoids	1·79
Fat	·16
Carbo-hydrates	21·31
Salts	·97

Here the nutriment may be looked upon as about 23 per cent., consisting of the albuminoids, fat, and carbo-hydrates. The fat and albuminoids are very low, but if served up with milk and cream, these two substances would be increased, and the combination rendered a more perfect food from a scientific point of view.

Those potatoes are the most digestible and nutritious which in boiling break down into a floury mass. This is due to the breaking up of the starch. Young potatoes that do not undergo this process of breaking are in the highest degree indigestible, and should not be eaten by those who are not good starch digesters.

In the preparation of potatoes for the table the following points should be taken notice of:—

The albuminous matter surrounds the skin of the potato, and if the skin is removed one cannot help but remove this albuminous matter at the same time; it follows, therefore, potatoes should be boiled in their skins, which makes it possible to remove them without the albuminous layer underneath. Moreover, the skin acts as a membrane resisting the soaking out of the valuable salts. If potatoes are peeled they should not be allowed to soak in cold water or warm water before boiling, as this helps to dissolve out the soluble salts. Remember that the dissolving out of the salts is reduced to a minimum by baking or steaming the potatoes; both are preferable to boiling.

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